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Public Health in Newfoundland

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I FEEL highly honoured by being given this opportunity to speak to you to-night on what to me, at least, is an important subject—public health in Newfoundland. You will not, I hope, consider it presumptuous if I just mention that the correct pronunciation is Newfound*land*. You will, I know, forgive me, too, if I occasionally refer to "our country". We have not yet become completely accustomed to calling it a province.

You will be glad to hear that I have no intention of prolonging your period of discomfort by going into historic detail, but I do feel it neecssary to give you a few words about the background of our recent constitutional change. Sir Leonard Tilley of New Brunswick quoted the Book of Psalms in 1882, in saying "He shall have dominion also from sea to sea." His words have come to pass, and it is to their everlasting credit that there were people in Canada as far back as eighty-three years ago who hoped and planned for the inclusion of Newfoundland under the original provincial union arrangements. On many occasions since, the whole subject of Confederation has been obscured by the fog of political campaigning. For many decades, ballads have been written and circulated about the dangers of becoming a province of Canada. As recently as a year ago, a parody on that well known song "A Mother's Love" was mournfully sung in many places in the country. One verse might be recalled—representing a mother's advice to her son, who was leaving home to fish on Labrador.

"Don't vote Confederation,
Now that's my prayer to you,
For we own the house we live in,
Likewise a schooner, too.

An address at the annual dinner of the Canadian Public Health Association, held during the thirty-seventh meeting of the Association, Halifax, June 27-30, 1949.

But if you vote for union,
For that line that torments pa,
You'll be always paying taxes,
To the men in Ottawa."

I have spent enough time in Nova Scotia to be somewhat allergic to the words "Maritime Rights", and was therefore not too much surprised by the enthusiastic greeting of a Cape Bretoner after our second Referendum last year. He congratulated me most heartily on the fact that our island would now be taking the place of his in representing a particular and not too popular segment of the alimentary canal of Canada.

There were many Newfoundlanders who would have preferred to return to our original status, but more recent events lead me to hope and, indeed, to believe that as the years roll by all our people will be proud to be Canadians and that you Canadians of longer standing will be proud of your additional citizens.

Public health problems are very similar in many vastly different places. In Newfoundland, they are aggravated by the sparsity of the population and by the difficulties of transportation and of communications. A few statistics may help to explain the situation. Our province is an island roughly triangular in shape, with an area of 42,000 square miles. This does not include the important dependency of Labrador of over double that area and, we believe, of great potential value. Newfoundland's area is about 85 per cent of the combined area of Nova Scotia, New Brunswick and Prince Edward Island but it has less than one third of their combined population and less than one tenth of their motor roads. A population of less than one third of a million people are scattered in almost fourteen hundred villages and towns of which only twenty-five have more than one thousand inhabitants. A large proportion of those villages are accessible only by water.

Winslow defined public health as "the art and science of preventing disease, prolonging life and promoting physical and mental efficiency through organized community effort".

We think that in Newfoundland we have in some ways at least come nearer to the full meaning of that definition.

The Department of Health in Newfoundland has since its inception been closely and vitally concerned with the provision of medical care and hospitalization. To any of you who, on occasion, may become bored with some of the more stereotyped procedures of public health, I commend the variety of effort that these extras bring to one's attention. In doing so, I recall the lady who complained that her health was deteriorating because of her inability to obtain molasses with which to make a drop of moonshine; the patient with a pituitary tumour whose attention was first directed to her illness by a limitation of her field of vision which prevented her from seeing her opponents' hands while playing the national game of forty-five; and the anxious husband who, on New Year's eve, sought to avail of an emergency plane service by requesting an aircraft to take his wife to hospital on February 15th.

In addition to this intimate association with medical care problems, the Provincial Department of Health is in direct administrative control of a general hospital of 400 beds, an isolation hospital of 50 beds, a 600-bed hospital for the mentally ill, a tuberculosis sanatorium of 360 beds and fourteen smaller cottage hospitals with a total capacity of over 300 beds. Because of the tardy development of municipal or county government, many of what would ordinarily be the responsibility of such smaller political units become the direct problems of the central Government department.

At present our province has a total of one hundred and thirty-six physicians including all those in institutional or other full-time official positions. This gives an overall count of just under 2,500 people to every doctor. In the more remote areas, however, most practising physicians are looking after over 5,000 people each and in some cases as many as 10,000. All but a few of the physicians are associated with the Health Department on the basis of full-time or part-time subsidies or a fee-for-service arrangement.

The relationship between the physicians and the Health Department has been excellent. It is my fervent wish that none of the officials of the Canadian Medical Association or of the Department of National Health and Welfare will do anything to spoil that relationship.

Approximately one third of the population is covered by a health and hospital insurance plan which for ten dollars per family per year covers everything except transportation, obstetrics, drugs and private or semi-private accommodation. This plan is based on a hospital of, say, twenty-five beds. There may be two, three or more physicians practising in a Cottage Hospital Area but usually transportation difficulties make it impossible for more than one of these to make use of the hospital except that the others send along their patients. District Nursing centres fill in the areas not covered by medical practices. Shortage of personnel has been the greatest difficulty. It can be readily seen that the whole plan is only possible through the deficits being shouldered by the Provincial Health Department, which is also responsible for the administrative detail.

My going into some detail about certain aspects of some of our efforts along orthodox public health avenues is not with the thought of divulging any new or startling information. Rather is it that you may know something of what has been done and, in some instances, of what has not been done in your newest province. We have had the same experiences as I feel that many of my listeners may have had in attempting to carry out some of the time-honoured procedures. In some instances we have come to believe that there is great need of reorganizing our thoughts and our ideas of just how to build a healthy country. More particularly do we feel that the public health official must be actively interested in the way that people live, the houses they inhabit, their surroundings while at work and at play, what happens when they get sick, if a real and lasting contribution is to be made to the prevention of mental and physical disability and disease.

In sanitary engineering and in health education we have barely scratched the surface of what has been accomplished in more highly organized societies.

Many communities have not had the benefits of safe community water supplies or adequate public or private sewage disposal systems. Viewing the situation through the coldly scientific eyes of preventive medicine, the comparative absence of typhoid fever is almost disappointing. We think that the ultimate universal provision of ordinary sanitary amenities must come as a result of more vigorous and more practical methods of health education. To make more progress in health education we must make greater use of more people from outside the Health Department, the staff of which should never try and can never hope to be the only medium through which the individuals of the population are informed about health. So far we feel that our most successful effort here has been through Junior Red Cross, which in Newfoundland has been sponsored jointly by the two Provincial Departments of Education and Health.

The control of communicable diseases is no easier than in other provinces. We have abandoned quarantine procedures in such diseases as measles and whooping cough with no detectable worsening of conditions, and have been gradually reducing restrictions in scarlet fever, diphtheria, etc. Immunization against diphtheria and whooping cough, although somewhat spotty, has attained satisfactory status in localities but there are still some isolated communities in which sporadic cases of diphtheria are reported. In the city of St. John's we have had successful results in toxoiding pre-school children through house-to-house visits by our nursing staff, who give the injections themselves. We had found attempted immunization of this group in any other way to be practically unsound. There was a major epidemic in St. John's subsequent to the epidemic in Halifax and even now we get occasional reports of a fatal case, from somewhere along the coastline. Only five years ago I visited a village of twelve homes where there had been three fatal cases of diphtheria in the previous week. Without immediate medical aid, parents were using vinegar to remove the membrane from their children's throats. In the last year for which we have complete records, fifteen deaths were attributed to this disease throughout the population, or 4.5 per 100,000.

We have done comparatively little smallpox vaccination in recent years and I regarded the experience in this seaport with some envy when I learned that thousands of people have been vaccinated following the scare of a few years ago. It so happened that this was on one of the very rare occasions when St. John's harbour was blocked with ice. Otherwise that particular ship might have proceeded there, and we might have vaccinated at least some of our unvaccinated.

Tuberculosis is undoubtedly our major public health problem. With hundreds of infective cases in their homes, I am literally fascinated when I hear more happily placed health officials speaking of positive sputum cases with the same outlook as if throat swabs positive for diphtheria were under discussion. In spite of a very appreciable decline in mortality rates and a threefold increase in sanatorium beds during the past fifteen years, we still have barely one bed per annual death. Present building construction will almost double our available accommodation—we hope—by this time next year. The

tuberculosis death rate for St. John's in 1948 was 102 and the average for the past five years, 119.

We have had the same initial disappointment with streptomycin as others have reported but have also had some spectacular results. In spite of some adverse criticism of B.C.G., we feel that it should have a bigger place in our program. So far we have used it only in student nurses, other staff and selected infants. Prior to April 1st, Newfoundlanders would not be convinced that the medical requirements for immigration into Canada were directed to anybody but us, and it is with no feeling of loss that we now pass through the sheds of North Sydney. I imagine that the change has been as welcome to the officials at that port. . . .

Syphilis has been present in some localities for many years. We could not but admire the control program of the Armed Forces even if we did get an occasional "contact report" which asked us to locate somebody designated as "Mary" who was alleged to have spread her spirochaetes in an "alley off Water Street". We are believing more in the efficacy of penicillin therapy, and I say this even though we are seeing more neurosyphilis, probably because of more intensive case-finding methods.

Infant mortality for the last recorded year was 73.8 for the country and 62 for the city of St. John's. Neonatal deaths and gastro-enteritis are the two biggest factors. We have made some progress with the latter but very little with the former. We hope that proper methods of health education, more adequate antenatal care and an intensification of our efforts to train untrained midwives will help. It is true, too, that doctors who carry too large a load of patients do not make much contribution to the lowering of neonatal death rates.

Mental health, still in its comparative infancy, has made great strides in recent years. Five years ago the treatment of the mentally ill as out-patients or in general hospitals was unknown to us, but is now generally accepted. We are, however, still suffering from an acute and almost overwhelming shortage of hospital beds for the mentally ill and have no special provision for mental defectives.

School health procedures are still baffling us and we have more than a suspicion that some of the accepted procedures are outmoded. This was forcibly brought to my attention a few years ago when a particularly energetic school nurse in following up defect slips advised a mother to take her child to her doctor to see about his tonsils. It developed that the child in question was by that time a medical officer in the R.C.A.M.C.

A high infant mortality rate and a high tuberculosis death rate have naturally turned our thoughts to nutrition. Just before I left St. John's, a doctor's wife warned me not to be another of those who said that Newfoundlanders were starving. Some of you may have heard or read of the results of recent nutritional surveys in our island. While recognizing that the last word has not yet been said on human nutrition, and the exact significance of certain clinical signs has still to be determined, we were convinced that the nutritional status of our people left much to be desired. Realizing that health education as

a means of improving nutrition was of necessity a long-term project, and keeping in mind the somewhat limited dietary available in many places, we decided that our best immediate hope was in the fortification of certain widely used food-stuffs with synthetic vitamins. The manufacturers of margarine had done this voluntarily, and it was made a legal requirement in the case of flour. Subsequently the addition of calcium in the form of bone meal was also made mandatory. We have also been watching with interest the attempts to fortify canned milk with vitamin C. We know that, ideally, people should eat foods in which the natural nutrients are retained but we know of no place that has as yet been successful in attaining that end, under normal conditions. With our added difficulties of transportation and communications, and of a relatively less fertile soil, we had no reason to believe that we should be any more successful. And of still greater significance now is our belief—not without supporting evidence—that a five-year period of compulsory use of enriched flour has made a substantial contribution to our nutritional status.

We have had the best of relationships with our voluntary and non-official agencies (and the reason may be that they have not multiplied to the extent that they have in some areas). A young and vigorous Tuberculosis Association is working in close co-operation with our Health Department. Our people in Northern Newfoundland and Labrador have benefitted for years through the hospitals and nursing stations, doctors and nurses of the International Grenfell Association. Although subsidized to some extent through Departmental grants, the volume of medical, nursing and hospital care is out of all proportion to the payments made. I have always been thankful for the existence of this organization and the help given by its personnel.

I hope I have succeeded in giving you some ideas about Newfoundland but there is much of what we feel about our country that cannot be put into words. You may understand what I mean when I mention the visiting official who after spending a fortnight with us was heard to remark that he had but a hazy recollection of ever having lived or worked elsewhere. Some less charitable souls have referred to this condition as "Newfy-Goof", which as far as we know is not a preventable disease.

In closing I want to thank you for this opportunity of speaking to you, and to apologize for the simplicity and unscientific nature of this address. Let me also through you express the gratitude of our people to the many Canadians—individuals, organizations and institutions, official and unofficial—who have done so much for us through the years and particularly in the past twelve months. I know that our inclusion in your public health family will serve further to strengthen those ties which you in the older parts of Canada have done so much to establish.

Cancer Mortality Trends Under Different Control Programs

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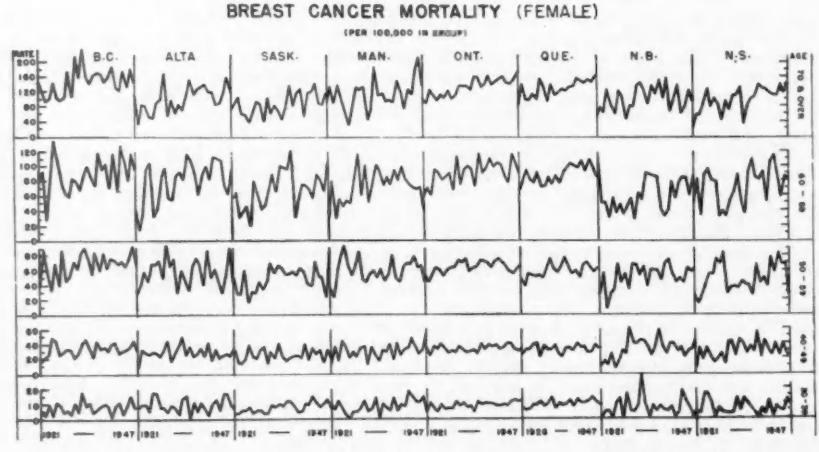
CANCER mortality trends under vastly different "control" programs are compared in this note. For reasons which must be obvious to the clinician, pathologist and vital statistician (and are indicated in the footnote below*) only the over-all mortality from cancer (cancer and other malignant tumours) and the mortality from breast cancer, as officially recorded, are used for this purpose. Accordingly, the age and sex specific rates of these mortalities for 1921-1947 for seven provinces and for 1926-1947 for one province are shown in the graphs. The rates for Prince Edward Island, being very erratic and holding to the same general pattern as the other provinces, have been omitted.

**It is clear in the everyday practice of both the clinician and the pathologist that, in deaths from cancer, the primary site cannot always be specified under the attendant circumstances, and that, when specified, it is not infrequently highly speculative, uncertain and even quite erroneous. It is equally clear to the clinician and the pathologist that the incompleteness and unreliability of specification of the primary site vary widely with age, sex, site, time and place. The incompleteness and unreliability are evident also in vital statistics. There, quite understandably, in a considerable proportion of deaths charged to cancer, no primary site has been specified, or a site probably or certainly secondary, e.g., liver, lung, peritoneum or bones, has been specified as primary, or a location, e.g., pelvis, abdomen or chest, instead of the organ, has been specified. The deaths charged to specified sites are thus patently deficient to the extent of such incomplete specification, and, on clinical and pathological experience, have the additional uncertainty of erroneous specification. The records of vital statistics similarly reveal wide differences, in both time and place, in the proportion of cancer deaths assigned to an ill-defined group and to the various specific sites. Obviously the disparity, indeterminable and varying, between the actual and the recorded mortality, is very much greater in cancers charged to specific internal sites, including the uterus, than in others. The recorded data, therefore, of cancer of specific internal sites, including the uterus, do not provide a sound basis for tracing or comparing the trends of these actual mortalities. On the other hand, it will be obvious that the recorded data of over-all cancer mortality are quite unaffected by different distributions of diagnoses in time and place among the various sites or locations, defined or otherwise, within the cancer group. These over-all data still have their limitations; they undoubtedly include deaths wrongly diagnosed as cancer, whether or not specified by site, and they exclude others wrongly diagnosed as not cancer, and the error undoubtedly varies with sex, age, time and place. Nevertheless, the error is small in relation to the whole number in any age sex group except in young life (not included here) where it is larger, as it is also in older age where it can be better identified in the records and can, to some extent, even be appraised by checking with the deaths charged to senility and other categories. The over-all recorded mortality rates thus provide a basis for tracing trends from which, with due consideration and reservations, reasonably reliable comparisons can be made and fair inferences drawn regarding that mortality. So, too, the diagnosis of breast cancer at death is, in the vast majority of cases, so obvious that this recorded mortality also serves well as a basis from which inferences can be drawn with some confidence.*

Provincial Programs and Activities

Preliminary to comparing the provincial programs, it will be realized that there could be services of high calibre—competent medical attention and good facilities, both readily accessible and fully used—without any special program; and that there could be increase and acceleration of treatment (i.e., advance of treatment to an "earlier" time or stage of the disease) through many factors apart from such programs. Urbanization, freer travel, improvement in economic status, the development of prepaid medical and hospital plans, have all tended to facilitate and thus to increase and expedite the use of medical services, in general, and particularly of the specialist. Extensive treatment has come to be more readily advised and, too, accepted by the patient. Propaganda and publicity



The drastic reduction of the graphs obviously could obscure small declines, but actually there is no decline to obscure. The data are available on request from this department.

of official, semi-official and voluntary organizations of national scope, aimed at stimulating earlier diagnosis and treatment of cancer, have been spread through all the provinces; and increased activity in any province is likely to so influence routine practice of medicine and public health in other provinces. While the effect of all such factors on increase and acceleration of cancer treatment cannot be precisely or even grossly measured, nevertheless it must be accorded consideration in comparing rates and "control" programs.

Although the Blair Report (1) deals primarily with the conditions in 1947, it also gives some indication of the development of the respective "control" programs and some slight indication of the facilities and services available previous to or apart from the programs. More detailed information is found in the annual reports issued by the provincial departments of health or by the institute, commission or foundation to which, in some provinces, whole or part responsibility for cancer activities has been delegated. In these media there are recorded for, let it be called, Province A, somewhat limited facilities with free or subsidized pathological or radiological diagnostic services severely restricted in their application, and an organized program consisting only of the establishment in 1940 of one clinic with, again, very restricted *free* services. Even this clinic, after one year, was so disrupted by war's exigencies that it practically failed to function or develop; reorganized in 1944, the number of new cases attending (much less than 50) was far short of that of clinics in some other provinces or of any number that would indicate an active organization. Not till late in 1947, the last year in the data presented here, did a really active program get under way. For Province B, a "control" program was initiated in 1929, implemented in 1931 and so vigorously developed that, since early in 1944, complete diagnostic and treatment services and care, all tax-paid with no direct charge to any patient, have been provided for all cancer throughout the province. Between these two extremes there have been various gradations of facilities, services and activities. Some provinces have, at different dates, provided for voluntary reporting and some for compulsory reporting; some, perhaps wisely, have taken no action in this regard. Some have provided, in whole or in part, for diagnostic services (radiological, pathological and/or clinical), some without direct charge for all residents, some for certain groups (e.g., the rural population and indigents), and some with payment on a means basis. Some have provided radiotherapeutic service in various degrees of completeness and on various bases of payment. Only the one province (B), up to 1947, had provided, as indicated, for complete treatment of all types, as well as diagnosis, at no direct cost to any patient. In general, existing facilities and accommodation have been used in supplying services; in some, very great expansion and in others very little or none has been made. Some provinces have carried on extensive "educational" campaigns with emphasis variously placed on school children, teachers, nurses and the home; some have not indulged in these activities to any extent. Some have organized, maintained and expanded very active community cancer societies for public stimulation and enlightenment; some organized such groups but allowed them to lapse, and in some, it would appear, none was organized. Obviously there have been various combinations of the features mentioned, with changes, additions, extensions and development in some provinces over the years. In short, in the past twenty years

some provinces have spent much money derived from various sources and others have spent little from any source.

A highly desirable comparison would be of the actual amount of treatment with its increase and acceleration in each province. However, as there is no record of private patients in the past, there are no figures for direct comparison of *all* treatment or for measuring the amount of increase and acceleration. Nevertheless, in the Blair Report and in the provincial reports, substantial information in this regard can be obtained. For instance, in Province A, already noted, of about 500,000 population, with limited facilities, very restricted free services and practically no active "control" program until late in 1947, the clinic's new patients numbered 13 in 1944, 36 in 1945, 46 in 1946 and, under stimulation, 106 in 1947. The Blair Report notes, very significantly, that "practically all new cases are clinical cancer and in many instances are seen in the late stages of the disease." On the other hand, in Province B, of nearly 850,000 population and with a program implemented in 1931, developing to full tax-supported diagnosis and treatment in 1944 and including extensive "educational" activities, community cancer organizations, etc., the new patients numbered 500 in 1932, 1094 in 1940 and 3632 in 1947; the proportion of new cases in whom no cancer was found increased from 20 per cent in 1932 to 39 per cent in 1940 and to 55 per cent in 1947; and, in a very considerable and increasing proportion of the cancer cases, the disease is recorded as in a relatively early stage (e.g., in 1947, 64 per cent of the new cases of cancer of the cervix were classified in stages I and II). The striking contrasts between these provinces in the number attending, in the increase of new cases, in the increasing proportion of non-cancerous conditions and in the stage of the cancer cases indicate, with practical certainty, a similar contrast between them in the amount of treatment, in its increase, its time and acceleration. Between these extremes are gradations as noted for the programs previously. In general, the amount of increase and acceleration of treatment appears to be related to the "control" programs and particularly to the degree of provision of free or subsidized services.

The Blair Report and the provincial reports thus clearly establish that there have been wide differences between the provinces in the cancer "control" programs—in time, content and aggressiveness; differences, too, in facilities and services apart from organized programs; and differences, also, in the amount of treatment and in its increase, its time and acceleration, with the latter apparently related, in general, to the programs. If any of the programs had been effectual in reducing cancer mortality to any significant degree, differences should be found in the trends of cancer mortality in the different provinces.

Factors Influencing Rates

Reference to the many factors influencing rates is necessitated only by the fact that its omission invites or allows the inference that such factors, "variables", have been neglected here in analysing the trends, comparing them and reaching conclusions.

It is quite apparent in the graphs that the short-term, or year-to-year, fluctuations in the rates are greatest in the provinces with the smaller populations, decreasing to very small proportions in Ontario with the largest population;

they are greater, too, in breast cancer with its smaller numbers than in all cancer. They are thus due, in the main, to chance as related to size of figures. However, as is well known, other factors could cause some variation in the rates, especially over longer periods of time or between different places. Dependent as diagnosis and certification are, not only on professional competence and availability of medical services and facilities but also on the degree of frankness and precision dictated by local practice and circumstances, and susceptible even to the varying subject emphasis in the lay and medical press, variations due to differences in diagnosis and certification are practically inevitable. Such variations are evident in the graphs. It will be noted that there is a tendency for the Saskatchewan rates and even for the Alberta rates to be slightly lower than the rates for the other provinces throughout the whole period, including the years before any cancer "control" program was ever suggested; the most reasonable explanation of this, wanting facts to the contrary, is that it is due to differences in diagnosis and certification. So, too, there will be noticed the spotty and irregular increases in some of the rates—more common in the male than in the female, affecting both sexes to a greater extent in the older age groups and more regular or consistent in some provinces than in others; with some reservations mentioned later, these, too, are more credibly attributable to differences in diagnosis and certification than to any other factor.

Differences and changes in book-keeping obviously must be considered. Very fortunately, as the book-keeping of all death certificates of all causes for all provinces for the periods shown has been done by the Dominion Bureau of Statistics, there has been entire uniformity in selection, classification and tabulation from province to province. The very small, almost insignificant, changes in selection and classification in accord with the decennial revisions of the International List of Causes of Death have affected all provinces similarly. The population figures used in calculating the rates for the intercensal and post-censal years are those regularly provided by the Dominion Bureau of Statistics; while there may be some minor adjustments for the 1942-1947 years, it would be extraordinary if they would affect the lines to any significant extent.

Other factors, too, much less tangible and of even less significance, creep in as possible causes of very slight variations and cannot be altogether ignored. For instance, it is conceivable that, apart altogether from advances specific to cancer, advances in general surgical technique, anaesthetics, transfusions, etc., could give a slight reduction in recorded cancer deaths through reducing operative, post-operative or related mortality in conditions erroneously but unavoidably included with the malignancies. Wide differences in mortality from respiratory infections, other infections or even other conditions could exert some slight influence in either direction on recorded rates; and, in cancers that are liable to kill by local extension before metastases develop, improvement in postponement of death could give a temporary reduction in the mortality.

It is, of course, impossible precisely to measure the influence of any or all such factors at any one time, much less to assign its actual limits under changing conditions or in different places. In data so potentially subject to multiple influences and carrying an indeterminable degree of uncertainty of comparability, too fine comparisons are not warranted—too much must not be made of too

little. Any differences between or any change in trends, therefore, in order to carry conviction of reality and significance, would necessarily have to be of some reasonable extent beyond the likely but strictly unpredictable limits of all such factors, be reasonably consistent in different age groups (but allowing considerable leeway in older life), be reasonably compatible with all other relevant factors, and *not* be more reasonably attributable to artificial causes. These criteria might exclude from admissibility very small but real changes in cancer from several sites, or relatively larger changes in cancer from any one site making little impression on the over-all picture. The chance of such an oversight is small in comparison with the chance of misinterpreting artificial changes as real or being unduly impressed by favourable appearances; however, due caution must be exercised in drawing, from the over-all picture, too sweeping conclusions regarding any specific cancer.

Comparison of Trends

The graphs show that the Ontario rates, presented and discussed in more detail previously (2, 3), provide a pattern which, when allowance is made for differences in size of numbers, etc., is reproduced almost identically by the other provinces.

For both breast cancer mortality and for all cancer mortality the tendency of the female rates to maintain a near level from early in the experience is strongly marked. This, in itself, suggests a greater degree of reliability and comparability in these (uniform) rates, and, too, a greater stability in the whole cancer mortality problem in the past two decades than might have been anticipated; it suggests also that these level rates have been but little influenced by extraneous factors. Although an occasional line might simulate a slightly declining trend, its fallacy is readily revealed by the lack of consistency in other age groups in the same province; other slight departures from the general level—for instance, the increases in old age, and occasionally in other age groups, as mentioned—are reasonably accounted for by differences in diagnosis and certification. In no age group in the female sex in either breast cancer or total cancer mortality in any province is there any decline that can be accepted as real or can be credited to an increase or acceleration of treatment through a "control" program or otherwise.

In the male rates the tendency to show a slight increase, as noted in the Ontario figures, is not so consistently reproduced by other provinces but it is quite apparent. Such slight differences as there are in these trends in the recorded male rates of the different provinces could be due to several factors; e.g., possibly a greater real increase (highly controversial) in pulmonary cancer in some provinces than in others, due, perhaps, to greater carcinogenic industrial exposure; or, and more probably, greater expansion of pathological or radiological diagnostic service in some provinces than in others, giving different degrees of change in diagnosis. The slight differences correspond in no way to differences in "control" programs. Not in any age group in the male in any province is there any suggestion of any decline in recorded cancer mortality, or any lesser increase in any corresponding with a more effectual program.

Thus, in spite of the great differences in time, content, aggressiveness and

effect of cancer "control" programs, there are no contrasts in cancer mortality to conform with the absence or presence of "control" programs or differences in the programs. In fact, the similarity of the trend pattern throughout is the most striking feature of the graphs (and one that, in itself, has obviated the necessity for setting out, in this note, the details of development and extent of the program and services in each province). The trends in Province A are practically identical with those in Province B. It is quite impossible to select even one province in which the trends would suggest a superior program, longer in operation, more vigorously applied, or more effectual than others; it is similarly impossible to select one province whose trends, by comparison, would suggest the absence or weakness of a program. Program or no program, increase or no increase, acceleration or no acceleration, early treatment or late treatment, much money spent or little, the trends of breast cancer mortality and of all cancer mortality show no significant differences from province to province. And, in spite of definite acceleration of treatment in some provinces through "control" programs or otherwise, and in spite of all other advances in diagnosis and treatment in the past 20 years, there is not in any age group in either sex in any province in either breast cancer mortality or all cancer mortality any decline that passes even one of the stipulated criteria, let alone all of them. As cancer "control" programs and propaganda anticipated and promised large reductions in mortality ("perhaps not more than 50%") (4), it must be concluded that they have failed dismally in this objective.

Why have the programs failed? This question has been considered previously in regard to Ontario (2, 3). It was there submitted that the weight of evidence indicated that the program had succeeded in increasing and accelerating treatment, but, in spite of that, had failed actually to reduce mortality. On this and on other evidence, clinical and pathological, it was contended that early treatment is incapable of controlling, to any great extent, mortality from cancer that gives remote metastases. It was further postulated and other evidence was advanced to support the hypothesis that the great part of spread of remote metastases occurs before interference is practical. This hypothesis is now supported by the fact that in another province, Province B, where, as noted, a very active "control" program was implemented in 1931, and, since 1944, has provided tax-paid complete diagnostic and therapeutic services, where clinic attendance has increased to almost embarrassing proportions, where cases in whom no cancer is found have increased to more than a half of the new attendance and where, in a very considerable proportion of those in whom cancer is diagnosed, the disease is classed in a relatively early or even "precancerous" stage, neither do the trends in either breast cancer mortality or total cancer mortality show any decline, nor do they show any difference from those in other provinces with limited facilities, little or no program and little or no acceleration of treatment.

Summary and Conclusions

The age specific rates of mortality from breast cancer (female) and the age and sex specific rates from all cancer for all age groups of 30 years and over for each of eight provinces of Canada are presented and the cancer "control" programs in the provinces are compared. In spite of vast differences in the

cancer "control" programs giving great differences in the amount and acceleration of treatment, the trends in both breast cancer mortality and in all cancer mortality are alike from province to province. The provinces with very vigorous "control" programs and very considerable acceleration of treatment show trends practically identical with those of other provinces with limited facilities and little, if any, acceleration of treatment. There is no decline carrying conviction of reality in any age group in either sex in any province in the mortality from breast cancer or from all cancer. Although caution must be used in drawing, from the over-all picture, too sweeping or too precise inferences regarding cancer mortality from any specific site, there is nothing in these data to encourage optimism regarding any major site. These data, both in themselves and by comparison, thus provide further substantial evidence of the non-curability, in general, of cancer that gives remote metastases. They thus support the old contention, almost lost in recent optimistic claims, that it is the fundamental nature of the neoplasm rather than the time of treatment that determines, almost exclusively, the final outcome of treatment.

This does not in any way detract from the long-established curability of "cancer" (if the term is permissible) that does not give remote metastases, such, for instance, as the large part of cancer of the skin, which contributes only a small part of total cancer mortality, is readily amenable to treatment and cure, and in which the decline in the recorded mortality rate is well recognized and is compatible with the nature of the lession; i.e., its little likelihood of giving remote metastases.

It must be emphasized again that the objectives of treatment are not limited to cure (eradication of the disease). The objectives of treatment, apart from cure, include the prolongation of life in those cancers that are apt to kill by local extension before metastases develop and mental and physical relief in these as well as in others. Further, in the individual case, it is impossible, from the practical standpoint, to differentiate with certainty between the remotely metastasizing cancer and the cancer that does not yield remote metastases; and the individual patient, the clinician's responsibility, may be the exception to the rule even in cancers which usually give remote metastases. Thus, the earliest and best treatment possible is not only justified but required.

Acknowledgment

The data have been taken from the Annual Reports of the Registrar General of each province and from Vital Statistics, Canada, of the Dominion Bureau of Statistics. I am greatly indebted to Miss L. E. Stewart, Acting Recorder, Division of Statistics, Manitoba, Dr. Paul Parrot, Demographer, Ministry of Health, Quebec, and the Dominion Bureau of Statistics for kindly providing certain figures not previously published, and to the Dominion Bureau for providing the 1947 data in advance of printing.

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Letter from Great Britain

The Health Visitor in Great Britain

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THE present interest in the work of the health visitor in Great Britain has suggested that some extension of the account given in my July, 1949, letter might be of interest to you.

When Florence Nightingale was a young debutante of nineteen years of age, filled with a great desire to help mankind, she read one day the words of Dr. William Farr in the first report of the Registrar-General. This report, in 1839, was the first complete account of births, deaths and marriages of a whole nation ever to have been produced, so far as we know, in the history of man. Farr sat in the Registrar-General's office and did what he called "his little sums about human lives". Florence read of the great destruction of infant life; for the district around Leeds—from which I now pen these lines—he calculated an infant mortality of 227; out of every five children born in England and Wales two were dead before reaching five years of age. Some years were to elapse before this spirited girl overcame her parents' scruples and left the London society world for the Crimean war. But she never forgot Farr's moving descriptions of infant and child mortality. When she returned to found the profession of nursing and sat down in 1858 to write her 'Notes on Nursing' she showed how deeply she had thought on these matters. She saw with a vision far in advance of her time the part which a nurse might play in social medicine, as great as or greater than that required of her in the nursing of the sick. Read what this remarkable and practical visionary said in these 'Notes' nearly a hundred years ago:

"The same laws of health or of nursing, for they are in reality the same, obtain among the well as among the sick. . . . . The causes of the enormous child mortality are perfectly well known; they are chiefly want of cleanliness, want of ventilation, careless dieting and clothing, want of white-washing; in one word, defective household hygiene. The remedies are just as well known; and among them is certainly not the establishment of a Child's Hospital. This may be a want; just as there may be a want of hospital room for adults. But the Registrar-General would certainly never think of giving us, as a cause for the high rate of child mortality in (say) Liverpool, that there was not sufficient hospital room for children; nor would he urge upon us, as a remedy, to found a hospital for them.

"Again, women, and the best women, are woefully deficient in sanitary knowledge; although it is to women that we must look, first and last, for its

application, as far as household hygiene is concerned. But who would ever think of citing the institution of a Women's Hospital as the way to cure this want?"

This doctrine could not be accepted then; indeed, can we be sure even that it has been accepted now? It was too theoretical and as such repugnant to the English mind, but it sowed its seeds. It is almost certainly to this source that the Manchester surgeon, Mr. Turner, resorted for the teaching which led to the creation of the Sanitary Reform Association of Manchester and Salford, which began in 1862 (see July, 1949, letter). And so in typical English fashion began the visiting of infants by voluntary workers in Manchester and Salford, which has now passed into history.

Yet Miss Nightingale still felt that this work of 'household hygiene' was a call to the nursing profession. From the bed to which she retired in her Buckinghamshire home and from which she poured forth a stream of correspondence to great men and women in all countries, she still pondered over the matter. When an old lady of 71 it occurred to her that the new local authorities created two years before as county and county borough councils (in 1888) might be solicited in her cause. Her famous letter to the Buckinghamshire Technical Instruction Committee ("It is hardly necessary to contrast sick nursing with this . . . the needs of home health bringing require different but not lower qualifications, and are more varied.") resulted in a special course of training and launched the first professional health visitors upon the world. The new work for a nurse rapidly gained ground and in the early part of this century became linked with the idea of the infant welfare centre. Pierre Budin, an obstetrician at the Charite Hospital in Paris, had promulgated the doctrine that much infant mortality was due to infected milk supplies. His 'gouttes du lait' were copied in England as the milk depots first begun in St. Helens in 1899; they rapidly extended in scope as infant consultation centres and again widened the work of the nurse health visitor. This piecemeal growth of public health as an expansion of the idea of household hygiene was further extended to infant life protection under the great children's charter embodied in the Children Act of 1908. Fifty years before Dr. Curgenwen had campaigned for measures to save the illegitimate infants whose lives were so early extinguished and whose bodies were literally cast away on dung hills. 'Baby farming' was on everyone's lips when Mrs. Margaret Waters was hung in 1870 but the first infant life protection Act of 1871, and even the second of 1896 after a second baby farmer, Mrs. Dyer, had paid the penalty with her life, did not stem the evils because they did not introduce that essential of all social medicine, the supervision, guidance and teaching of professional staff. The Children Act of 1908 introduced such visiting and this work of infant life protection was added also to the expanding role of the health visitor.

At the turn of the century another evil was moving English minds—the scandal of our poor physique revealed by the medical examination of recruits to the Boer war. This was not surprising when we recall that the fathers and grandfathers of the young men of those days had suffered the full force of the worst effects of the industrial revolution. The Duke of Devonshire's 'Committee on Physical Deterioration' reported in so many words that we were a C3 nation, and Florence Nightingale lived to see the establishment, under the Education

Act of 1907, of the next great step forward in social medicine of school medical inspection and which introduced the nurse to her next venture of school nursing. Gradually this also became the work of the health visitor, linking school health with the home, a natural union which has been cemented by the Handicapped Pupils and School Health Service Regulations of 1945, passed under the Education Act, 1944, which prescribed that all school nurses should in future have the health visitors' certificate.

The piecemeal growth of the health visitor's work was carried a step further when another obstetrician, Dr. Ballantyne in Edinburgh, propounded in 1900 the then novel idea that the best way to reduce maternal mortality and morbidity was by the establishment of ante-natal clinics. The first venture to put this into effect took place in 1913 in London by the creation of clinics in those parts surrounding the Royal Free Hospital, and the Maternity and Child Welfare Act of 1918 spread the work rapidly all over England. To this work of teaching mothers how to live in pregnancy was added that of tuberculosis nursing to teach the tuberculous how best to avoid the spread of infection, and in its final stages has included the work of venereal disease contact tracing and social work to teach the meaning of venereal disease as a family and community evil.

And so by a process of slow growth of understanding of community health we reach the present day with health visitors working in the health departments of all county and county borough councils, teaching the meaning of healthful living in clinics, homes and schools, armed with a certificate of the Royal Sanitary Institute, a postgraduate qualification of six months' training which was first created in 1907 and later expanded to its present form by Ministry of Health regulation approximately 25 years ago. Into this placid pool of evolutionary development Mr. Bevan dropped a pebble—or was it a boulder—whose ever widening concentric ripples have not yet reached the banks—and may not do so in our time. Some say that he created a revolution in medicine; others that he hastened the process of evolution. For the nurse in preventive and social medicine it was evolution, a further step along the same road which she had already followed for 75 years; another piece or two in the jigsaw puzzle of public health that we in England have been fitting together so laboriously and slowly, like a chess game played by post. At this juncture (as mentioned in my July, 1949, letter) the National Health Service Act in section 24 makes the appointment of health visitors for the first time a statutory duty and it says:

"It shall be the duty of every local health authority to make provision in their area for the visiting of persons in their homes by visitors, to be called 'health visitors', for the purpose of giving advice as to the care of young children, persons suffering from illness and expectant or nursing mothers, and as to the measures necessary to prevent the spread of infection."

In section 28 of the same Act the following words appear:

"A local health authority may with the approval of the Minister, and to such extent as the Minister may direct, make arrangements for the purpose of the prevention of illness, the care of persons suffering from illness or mental defectiveness, or the after-care of such persons, but no such arrangements shall provide for the payment of money to such persons, except in so far as they may provide for the remuneration of such persons engaged in suitable work in accordance with the arrangements."

These lawyers' words, as so often, seem like dusty skeletons in a museum with no more meaning for the vital pulsating life of the community than can be conveyed by the tally numbers (24 and 28) hanging round their necks. Yet they constitute for social medicine the promise of great advances and they offer to the nurse an extension of work in the community field with honorable, useful and interesting new duties covering the whole range of community life.

To clothe sections 24 and 28 with meaning you must recall how much the constitution of our nation has changed. No longer the great loss of infant and child life which troubled our forbears; no longer much infectious disease; the pandemics of mortal plagues a thing of the past and the reservoir of endemic infections fast sinking. The expectation of life has gone up twenty years in living memory; we are a fast ageing people. The degenerative diseases of middle life and later years are more important to us now than the remaining afflictions of the neonatal period. When Booth wrote his *Life and Labour of the People in London* at the end of last century, and Seebohm Rowntree his *Conditions in York* at the beginning of this, these two great sociologists described a submerged tenth of our population. This has gone, leaving behind the biologically incomplete problem families, maybe 80,000 in number. So much of frank disease has been conquered, and so much that is easily remedied removed, that we turn our minds to the more difficult and obscure problems which have previously been little regarded. The lifeboat of social medicine which has gone out to so many large vessels in distress now turns its attention to the flotsam and jetsam which in a former age was washed up on the barren shores of the poor law.

Thus, we cannot continue to operate our services as if the nation were the same in constitution as when our fathers and grandfathers were born. Much of the drama of medicine is departing and more and more depends on careful attention to social factors. The babies whose first childhood we so successfully guarded half a century or more ago are in varying degree and in vastly increased numbers reaching their second childhood again in need of care. The chronic sick increase yearly in numbers and, if our institutions are not to be multiplied many times, must be cared for in the community. Our hospitals, now under State ownership, can no longer be left to operate as a thing apart from the ordinary life of the community. A survey at the Ratcliffe Hospital, Oxford, has shown that nearly half of 150 patients who had left the hospital failed to gain any, or the full, benefit from their stay for lack of after care. This must now be provided under section 28. Children leaving hospital are in need of supervision to ensure that the teaching is carried back to the home and to the school, and to ensure a complete record of health which can itself aid those responsible for guiding the child into industry. Hospitals too are now seeking background reports to help them in their diagnosis. The general practitioner is increasingly the exponent of social medicine and he too needs help in his teaching. In the field of industrial health, more and more it is realized that the health of the worker often depends upon social factors at home. In particular, we are looking afresh at the problem of the handicapped; these must not be allowed to become the 'substantially and permanently' handicapped for whom the new National Assistance Act (1948) makes provision. Each is a problem in social medicine and by painstaking application to detail each can be helped to health by the health department. Here

then is the flesh to clothe the lawyers' skeleton; here is the true meaning of sections 24 and 28, and here is the great new field of work of the health visitor; care and after care for hospital patients, a link with the general practitioner and industry, the medical auxiliary at the heart of social medicine applying specialized knowledge in social work and in teaching health from the cradle to the grave.

It is this new concept of the health visitor's role that has created a demand for more extensive training about which I spoke in an earlier letter. It would be an exaggeration to say that this need has as yet been fully recognized; nevertheless there is a growing demand in the medical and nursing world that this should be more closely examined. To give a basis for discussion, Professor Davies of Leeds University and I have put forward a detailed proposal for such reorganisation. This is based upon the two-years' basic course of nursing training (eighteen months basic and six months 'particular field'), about which I spoke in my July, 1949, letter, and it gives a much wider training in modern disciplines dealing with the structure of society. A 3½ to 4 years' training is equally balanced between the theory and practice of nursing based upon the hospital and the theory and practice of social medicine and social welfare based upon the university.

I give the particulars below in the hope that this matter, which is of such great importance to social medicine in England, may be of interest in your own affairs:

Proposals for new Entrants, being a university diploma course in medico-social work for health visitors and other medico-social workers

The course outlined seeks to fulfil these aims—(1) That the health visitor's training should be a complete training in socio-medical work; (2) That as a result of this training she should be eligible to obtain a University Diploma in socio-medical work; (3) That such training should make her eligible for most, if not all, branches of social work, subject to the completion of whatever short period of apprenticeship the various forms of work demand.

The implementation of these three aims requires a drastic modification of the whole procedure by which a health visitor is produced. The immediate difficulty which arises, and the most obvious, is the time factor involved in training. The present minimum time in which a health visitor can qualify is four years, assuming that she proceeds directly from one branch of training to another; in actual practice the time interval is more of the order of five to six years. On the other hand, a young woman can be qualified as a university trained social worker in two years which, with a further one year's apprenticeship in a special form of social work, allows her to enter the field fully equipped in three years or less.

This particular difficulty can be solved only if the Nurses Working Party Report received the force of law and what follows assumes that this would be the case. This Report recommended that there should be a basic training of two years, "18 months of which would be devoted to the fundamentals common to all fields of nursing and the remaining six months to concentrated training in a

particular field". We welcome this recommendation as a basis for the training of the health visitor and recommend that the "particular field" shall consist of a special course adapted to the particular need of the health visitor and described later in the memorandum. It seems to us essential to success of the scheme we outline that this special course should be recognised as a "particular field" and this more particularly because it will serve two purposes. It would make it possible to cut down the actual basic training in hospital nursing to 18 months and while ensuring that the pupil became eligible to sit the final examination for a State Registration at the end of two years it would also allow the final six months before the S.R.N. to form an integral part of the two year course in medico-social study which is necessary for the diploma course envisaged in this memorandum. We emphasise that this special course in the public health field should be undertaken at a university.

The following are the details of the course suggested:

General Structure of the Course. The aim of the course is to produce a well-trained medico-social worker with a basic training in nursing which we regard as of fundamental importance. The course would be of three and a half to four years' duration, of which two years would be spent in a university and would end with a qualification of university status which we also regard as of supreme importance for the future of field work in social medicine. The following would be the steps in the training:

	Time	*Where held*
1. Basic Nursing Training. (Working Party Report)	18 months	In training hospital
2. Special training in public health field	6 months	University and public health field
3. Examination State Registration		
4. Medico-social study course	18 months	(This may need to be extended.)
5. Examination for the Diploma in medico-social work		

N.B. It will be seen that in this training no mention is made of Part I of the C.M.B. Certificate. We have carefully considered this and we recommend that this requirement be dropped. Our reasons for this are that considerable time is spent in this six months acquiring skill and knowledge which the future health visitor will not be called upon to use. Further that the obstetric work should properly be done by midwives. This is not to say that the health visitor does not require some knowledge of obstetrics, such as the early symptoms of pregnancy, early signs and symptoms of diseases of pregnancy, together with some knowledge of the common gynaecological disorders; she should also have some knowledge of the social implications of child bearing. This has been included in the course detailed later.

There are two methods open of granting the suggested diploma in socio-medical work: (a) the creation of an entirely new diploma in medico-social science, and (b) the sub-division of the present diploma in social science into

two or more branches. We recommend the latter of the alternatives, that is, the establishment of a medico-social branch of the diploma in social science.

Diploma in Social Science

Two branches of the diploma ought to be formed, as follows:

Branch I—Comprising a course of study in medico-social work linked as indicated with the general basic training. This would be suitable for health visitors, almoners and industrial health welfare workers, etc.

Branch II—A course similar to those already established suitable for housing managers and personnel managers.

Candidates for Branch I would commence their course after their 18 months' basic training in hospital. Candidates for Branch II would enter the university without previous nursing training. The universities would need to agree (a) on the principle of establishing these two branches of the diploma and (b) on the content of the course for Branch I. The Ministry of Health would need to approve the diploma to be recognised under Regulations relating to qualifications of health visitors, and the following approaches will be necessary—(1) To the universities as already indicated; (2) To the Ministry of Health as already indicated; (3) To the local health authorities in regard to the assisted scheme for the training of health visitors in the extended course; (4) To the General Nursing Council for recognition of the six months' course in the "particular field" indicated as an integral part of the S.R.N. examination.

Suggested Course

We have not thought it necessary at this stage to give the number of lectures, demonstrations and visits required in each subject since this would require consultation between the various teaching bodies.

I. Eighteen months' Basic Training. (Common to all nurses.)

II. Six months' Special Training in the "particular field".

Paediatrics—Lectures and demonstrations on diseases of children. Welfare of healthy child, psychology of normal child, prematurity, child development, handicapped children, nursery care.

Elementary Obstetrics—Early signs of pregnancy, diseases of pregnancy; early signs of the common gynaecological disorders.

Infectious Diseases—Lectures and demonstrations, elementary epidemiology; infectious diseases, clinical demonstrations, tuberculosis, dermatology lectures and demonstration: elementary parasitology, lectures and demonstrations: hygiene of food, methods of control: occupational disease, elementary approach.

N.B. These headings are not intended to be exhaustive; they are merely intended as suggestions to illustrate the type of teaching required.

The six months to be recognised as the "particular field" a nurse may elect to take as her branch of intensive study. The course would be taken at a university by arrangement between the University Department of Public Health and the Health Department of the Local Authority and the Regional Hospital Board or Board of Governors of United Hospitals. At the end of this she should be eligible to sit for the S.R.N. examination.

III. Eighteen months.

Medico-social study.

(a) Economics—Economic theory and problems.

(b) Medical and Social History—History and development of public health and social services; development of social and economic groups; industry.

(c) Social Psychology.

(d) Development of Local and Central Government.

(e) Social relationship of disease—Community diseases, infectious diseases, rheumatism, venereal diseases, cancer, deficiency diseases, tuberculosis.

Medico-social Problems—Mental deficiency, mental diseases, problem families, illegitimacy, abortion, prostitution.

Medico-social aspects of environmental hygiene—Housing, occupation, food, water supply.

(f) Medico-social Legislation—Public Health Act, mental deficiency and mental treatment. Children Act; National Assistance Act; National Insurance Act; Disabled Persons, Industrial Injuries Act; Housing Act; Food and Drugs Act.

(g) Social Science—Social groups, employment, standards of living, method of survey.

(h) Industrial relations—Method of remuneration, Trade Unions, industrial disputes, arbitration, industrial psychology, industrial legislation.

(i) Social Ethics—Individual and society, responsibilities of the individual, responsibilities of the State, social maladjustment.

(j) Medico-social Statistics—Methods of presentation of vital and social statistics.

N.B. These headings are not intended to be exhaustive; they are merely intended as suggestions to illustrate the type of teaching required.

Practical Work—During the 18 months there should be arranged practical case-work undertaken in the field of the type already developed by social science departments and in amount generally equal to that of existing social science diplomates, amounting roughly to two days a week during terms, with two spells of two weeks and one of eight weeks during vacations. The pupil herself should undertake such work under supervision, including a complete social report on a number of families chosen to illustrate various problems. We have some doubt whether the 18/12 may not need to be extended.

Proposals for Existing Members

It is certain that if any change in the qualifications of a health visitor so fundamental as those outlined above were to be made, then some means would have to be sought to assist existing health visitors to achieve in some measure the same background. It is recommended that universities be asked to give facilities for the new course to be made available to existing health visitors by means of evening study (which might assist a few) and also to operate courses of three to six months for post-graduate refresher work.

A New Salmonella Type: Salmonella vancouver

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IN 1947, Ranta and Dolman[1] reported the results of two post-war years of operation of the Salmonella Typing Centre at the Western Division of the Connaught Medical Research Laboratories. Their findings brought to 37 the total types identified in Canada; and recorded 3 types isolated for the first time in North America, as well as 2 types which had not been previously reported pathogenic for man. Recently, a Salmonella strain was isolated from a patient hospitalized in Vancouver, the antigenic composition of which did not correspond to that of any type listed in the latest Kauffmann-White schema. This communication outlines the relevant data supporting our proposal that the strain should be designated *Salmonella vancouver*.

Clinical History

On March 22, 1949, a married woman, aged 43 years, entered hospital as a surgical patient under a diagnosis of uterine fibroids. On the day of admission, she had a temperature range of 99 to 100°F., but there were no obvious gastrointestinal symptoms. Next day, total hysterectomy of a fibroid uterus was successfully performed. Post-operative distension and abdominal cramps were severe, and despite 300,000 units of procaine penicillin daily for five days, the patient ran an irregular mild fever, ranging from 100 to 102°F. for the first three days after operation, and from 99 to 100°F. during the subsequent five days. Throughout this period, the abdomen remained soft but distended, cramps were increasingly frequent, there was some bile-stained vomiting, and stools were small and liquid. The general symptomatology was considered to indicate intestinal obstruction. Bowel irrigation with a high rectal tube, gastric suction, prostigmine, pituitary extract, castor oil and Epsom salts failed to relieve the symptoms. On April 2nd, projectile and apparently faecal vomiting ensued, and the radiologist reported "moderate distension of small bowel loops in the upper abdomen suggestive of mechanical obstruction".

Laparotomy was therefore again performed and a pelvic adhesion located, which had apparently caused the small bowel to become twisted around the

[1]Ranta, L. E., and Dolman, C. E., Canad. J. Pub. Health, 1947, *38*: 286.

omentum, and thereby obstructed. A small piece of omental tissue showing a fibrino-purulent exudate was removed, but no bowel resection was deemed necessary.

Despite this operation, the abdominal symptoms were not markedly alleviated, but persisted for about three weeks. Bowel distension, abdominal tenderness and cramps, were associated with frequent liquid stools, nausea, vomiting and anorexia. On April 7th, a specimen of faeces was sent to the Provincial Laboratories, from which a micro-organism of the Salmonella group was isolated. Sulphadiazine and sulphasuccidine were then prescribed.

Further specimens of faeces received at the Provincial Laboratories on April 18th and 27th were also positive for the same type of Salmonella, while specimens of April 25th, May 2nd and May 5th were negative. Between April 2nd and 20th the patient exhibited an irregular fever, with a daily peak ranging from 99.4 to 101.6°F. It then gradually fell to normal levels. General improvement in the patient's abdominal symptoms became evident on April 24th, and persisted thereafter. Sulpha-therapy was discontinued on April 28th, after a total of 2740 grs. of sulphasuccidine had been given. The patient was discharged from hospital on May 1st, free from gastro-intestinal symptoms, and there had been no recurrence three months later.

Epidemiological Data

There was no convincing evidence as to the source of the patient's infection. Neither she nor her immediate family had suffered from intestinal disorders in recent years. Stool specimens were procured from her husband and two daughters a few days after her discharge from hospital, and proved bacteriologically negative. Apart from a brief week-end visit, some months prior to her illness, to a small town across the border in the State of Washington, the patient had not been away from Vancouver. She seldom ate meals away from home. She received no fruit or other special foodstuffs from outside sources during her stay in hospital, and no other proven cases of Salmonellosis occurred in the hospital while she was there. Nor indeed were any cases traced to this hospital for several weeks prior to her admission or subsequent to her discharge.

The only clue related to a young woman who had stayed overnight at the home of the patient a few weeks prior to the onset of the latter's gastro-enteritis. The visitor was in good health at the time, but had suffered an acute gastro-intestinal illness while holidaying in Mexico City two to three months previously. She had been treated there with sulpha drugs. This person was eventually traced. Stool specimens secured from her on August 2nd and September 1st proved negative for the Salmonella group.

Bacteriological Findings

The biochemical and serological reactions of the strain isolated from the patient were investigated independently in the Western Division of the Connaught Medical Research Laboratories, and the Laboratory of Hygiene, Ottawa. The findings in the two laboratories are in complete accord.

Biochemical Reactions: The organism, a motile, Gram-negative rod, fer-

mented dextrose, mannitol, xylose, arabinose, dulcitol, sorbitol, maltose, inositol, laevulose, trehalose, galactose, mannose, rhamnose and dextrin, with the production of acid and gas in 24 hours. Lactose, sucrose, salicin, raffinose, adonitol and glycerol were not fermented. Indol was not produced. The Methyl Red test was positive, while the Voges-Proskauer reaction was negative. Urea was not broken down. Citrate was utilized. H_2S was produced. Slight acid was formed in litmus milk with no clotting. Gelatin was not liquefied.

Serological Reactions: The organism was agglutinated by *S. gaminara* (XVI: d-1, 7) O antiserum to full titre. An O suspension of *S. gaminara* was agglutinated to full titre by an antiserum prepared against *S. vancouver*. It was further demonstrated that absorption of *S. gaminara* O antiserum by *S. vancouver* removed all O agglutinins for the homologous type, and that *S. gaminara* was capable of exhausting all O agglutinins from *S. vancouver* O antiserum. The somatic antigenic structure of *S. vancouver* was therefore XVI.

The organism was diphasic when received for identification, and was agglutinated to titre by *S. paratyphi* C (VI, VII: c-1, 5) phase 1 H antiserum. An H antiserum prepared from *S. vancouver* was found to agglutinate *S. paratyphi* C in phase 1 to titre. Moreover, complete reciprocal absorption of agglutinins from the respective heterologous antisera by *S. paratyphi* C in phase 1 and *S. vancouver* in phase 1 was demonstrated. This established the major phase 1 component as "c".

Suspensions of *S. vancouver* in phase 2 were agglutinated by "1, 2", "1, 2, 3", "1, 5", "1, 6" and "1, 7" antisera, but only to titre by "1, 5". Furthermore, single factor "5" antiserum agglutinated *S. vancouver* to titre, while single factor antisera "2", "3", "6" and "7" failed to agglutinate the organism.

An antiserum prepared against *S. cholerae-suis var. kunzendorf* (VI, VII: -1, 5), which is permanently in phase 2, when absorbed by *S. vancouver* in phase 2, resulted in complete removal of the H agglutinins. Conversely, when the antiserum prepared against *S. vancouver* was absorbed by *S. cholerae-suis var. kunzendorf*, all of the phase 2 agglutinins were removed. Thus the phase 2 antigenic structure was established as "1, 5".

Various additional confirmatory tests were carried out. The antigenic structure of *S. vancouver* is, therefore, XVI: c-1, 5.

Discussion

The circumstances outlined in this report pose two questions. First, did *S. vancouver* reach British Columbia from Mexico City *via* a convalescent carrier of several weeks' standing? If so, it would be necessary to postulate that a latent infection was acquired by the Vancouver resident several weeks prior to her acute illness, and that she entered hospital carrying the infection. In that event, was the "obstruction" syndrome actually due to a severe attack of Salmonellosis, precipitated or aggravated by the first laparotomy, and not significantly benefited by the second? The answers to these questions must unfortunately remain conjectural. Many of the epidemiological and other problems incidental to Salmonellosis are too intricate for easy elucidation, but their solution should be hastened by proper employment of typing facilities.

S. vancouver is the first new type of Salmonella to be isolated and reported in Canada. There is strong likelihood that other unknown types await identification in this country. To secure their prompt recognition, as well as to ensure effective dissemination of information respecting type distribution throughout Canada, it seems essential (as Ranta and Dolman emphasized in 1947) that every Provincial Laboratory should fully cooperate with the Salmonella Typing Centre now established at the Laboratory of Hygiene.

Summary

1. A hitherto unreported type of Salmonella was isolated in April 1949 from a middle-aged woman, a resident of Vancouver, B.C., who developed severe gastro-enteritis in hospital, shortly after undergoing a hysterectomy operation. The illness lasted three to four weeks, and eventually responded to sulpha drugs.

2. The antigenic formula of the organism under the Kauffmann-White schema was verified in two independent laboratories as XVI: c-1, 5.

3. The source of the infection was not determined.

The Use of Tri-sodium Phosphate in Techniques for the Isolation of M. tuberculosis

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THE problem of simplifying the routine laboratory procedures associated with the diagnosis and with the following of tuberculous cases is an ever-present one because of the large volume of work demanded. Except in special instances, hospital and public health laboratories are forced to depend upon smears and cultures for the bulk of the routine work and can do animal inoculations only for selected, doubtful strains. For such procedures we feel everyone is agreed that we should try to develop the best possible techniques for concentrating our specimens so that the error of sampling may be reduced as much as possible. Secondly, particularly in the case of sputum specimens, our concentration techniques should be designed to destroy bacteria and fungi other than *Mycobacteria* so that the *Mycobacteria* may not be masked by overgrowths of other organisms when we attempt diagnostic cultures. In the past, one of the authors (H.S.) has tried various methods for sputum concentration but has always returned to the well established system of Petroff, i.e., 4 per cent NaOH added in volume equal to that of sputum, the mixture incubated at 37° C. for 30 minutes with frequent agitations, neutralized with normal HCl and centrifuged, etc. We have not been able to try the full homogenization in a paint mixer as advocated by Steenken but have been fairly well satisfied with the homogenization obtained by the manual method. Our chief objections to the use of NaOH are: (1) The 30-minute period of exposure to NaOH must be watched carefully if the risk of destroying the tuberculosis organisms is to be avoided. (2) The NaOH is not very good for destroying "contaminants".

Early in 1947 we began trials of tri-sodium phosphate as advocated by Corper and Stoner (1946). We tried some experiments which confirmed their findings on survival times in tri-sodium phosphate with broth, pleural fluid and sputum concentrate bases. We also tried different strengths of tri-sodium phosphate in order to eliminate the need for keeping the saturated solution at incubator temperature. These trials and the homogenization effects on sputum were so satisfactory that we adopted the method as a routine. Since the change we have been watching our over-all results in three laboratories in the Montreal district and these are summarized in Table I. The contamination rates for cultures are self-explanatory except perhaps for the re-check group. These are sputum specimens collected over 3-day periods by the patients at home and then mailed to

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TABLE I

SPUTUM SPECIMENS

Source	Conc. Method	Totals Surveyed	Cultures Contam.	− Smears + Cultures
General Hospital Wards	NaOH	2600	6.0%	5.0%
	Tri-sod.	2340	3.3%	* 4.0%
Sanatorium Wards	NaOH	1436	2.5%	8.7%
	Tri-sod.	1263	1.7%	10.2%
Re-Checks 36 hour specs. by mail	NaOH	895	14.0%	3.0%
	Tri-sod.	1274	7.2%	7.2%

*N.B. In this period smear methods were much improved.

the laboratory. The category shown as having negative smears but positive cultures have been collected on the principle that they represent specimens having only very small numbers of organisms present and should therefore act as indicators of organism-killing by the concentration process. It is regrettable that the one category to which we have attached a footnote on the table does not show good results but we feel quite justified in our comment because the searching of smears in the period prior to this was definitely not up to standard because of staff shortages. As a result of this, the 5 per cent figure shown is probably

TABLE II

ACTION OF GASTRIC SECRETION ON M. TUBERCULOSIS

Specimen	Condition	Temp.	Results of cultures taken at: 4 hours	8 hours	24 hours	5 days
Specimen No. 1	Plain	room	LG		O	O
		'frig.	HG		LG	O
	Tri-sod.	room	HG		MG	LG
		'frig.	HG		MG	MG
Specimen No. 2	Plain	room	HG		O	O
		'frig.	HG		HG	LG
	Tri-sod.	room	HG		HG	HG
		'frig.	HG		HG	HG
Specimen No. 3	Plain	room	HG	LG	O	O
		'frig.	HG	MG	LG	O
	Tri-sod.	room	HG	HG	HG	MG
		'frig.	HG	HG	MG	MG

HG—Heavy growth, MG—moderate growth, LG—light growth.

misleading in that a number of the smears reported "negative" should not have fallen into this category.

Because of our satisfaction with the use of tri-sodium phosphate for sputa, we extended its use to gastric lavages. We have always had some difficulty with the mucus in such lavages and we were impressed by such demonstrations as those of Schwarting (1945, 1948) and Kramer (1946) in respect to the inhibitive effects of gastric secretions on *M. tuberculosis*. Regardless of the actual mechanism of such effects, it seems to be clearly established that inhibition only takes place in an acid environment. Because the tri-sodium phosphate is alkaline, relatively non-toxic for the tubercle bacillus and also a good liquefier of mucus, we now issue sterile flasks for the collection of gastric lavage material with 5 c.c. of 15 per cent tri-sodium phosphate in each flask. Before making the final decision, we tried three gastric specimens known to contain *M. tuberculosis*. We were not able to find one with only a few organisms present at the time of the experiment. We used these because we felt that it was more important to study natural specimens rather than gastric secretions to which organisms from cultures had been added. Table II shows the results from aliquots of 3 different specimens, HG indicating heavy growth, MG moderate growth and LG light growth.

The following are the directions we favour for the routine use of tri-sodium phosphate.

SOLUTIONS: 15% tri-sodium phosphate (Na_3PO_4 12 H_2O) reagent quality.
Bromthymol-blue indicator.
2N hydrochloric acid (approx. 20 c.c. HCl + 80 c.c. H_2O).

1. For Sputum Concentrations:

Add an equal volume of tri-sodium phosphate solution to the sputum specimen and add a drop or two of indicator, to give a good blue colour.

Shake well. Incubate at 37° or leave at room temperature for 18-24 hours. Shake several times during the day.

Neutralize with hydrochloric acid (4%).

Centrifuge for 30 minutes at 2000 r.p.m. or faster.

Pour off supernatant and prepare smears from sediment.

Resuspend sediment in 1 c.c. of brain heart broth and inoculate culture media.

Allow slopes to incubate horizontally until excess moisture has evaporated. Cap with rubber and place upright in racks.

2. For Gastric Lavages:

Specimens are collected in sterile flasks in which 5 c.c. of sterile tri-sodium phosphate solution has been placed. When specimens are brought to the laboratory, more phosphate is added if necessary, plus one or two drops of the indicator.

Proceed as for sputum.

In summary, we feel that tri-sodium phosphate has the following advantages over NaOH for sputum concentrations:

It is less toxic and does not tie technicians down to a short period of shaking.

It is rather better for liquefying tenacious mucus.

It is better than NaOH for destroying undesirable "contaminants".

In respect to the use of tri-sodium phosphate for gastric lavages, we feel that it eliminates most of the toxic effects of gastric secretion on *M. tuberculosis*, it liquefies whatever mucus is present, and it eliminates the occasional "contaminant".

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"Cold" Stain for Acid-Fast Bacteria

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MODIFICATIONS of the usual Ziehl-Neelsen basic-fuchsin stain have been tried many times but have not proven effective. Most laboratory workers will agree that the standard system for Z-N is cumbersome and time-consuming, particularly in respect to the heating requirements. In the last few years attention has been drawn to the use of detergents or wetting agents for the purpose of promoting the transfer of material such as dyes into the substance of cells. Chermock and Muller (1946) reviewed the use of wetting agents such as Tergitol for histological work, and Randolphe and Neekel (1944) proposed the use of propylene-glycol for the purpose of carrying basic fuchsin into the cytoplasm of acid-fast bacteria.

In the laboratories of this hospital and later at Queen Mary Veterans Hospital we have attempted to assess the value of the propylene-glycol stain compared with the standard Ziehl-Neelsen technique in order to eliminate the necessity for heating the smears while staining. Because the material was in use in the laboratory for other purposes, Tween 80 was tried as a detergent as well.

For the propylene-glycol stain the technique recommended by Randolphe and Neekel was used.

For the Tween stain the following technique was arrived at after various trials:

1. Basic fuchsin—3.5 gms.
   Dissolve in 12.5 gms. pure phenol heated at 80°C. or place in boiling water bath.
   Add 25 c.c. of alcohol (95 per cent) when solution is cool and mix well.
   Make up to 300 c.c. with distilled water.
   While stirring add 30 drops of Tween 80 slowly.
2. For use, filter stain on to slides or into dish in which slides are to be placed.
   Allow to stain for 3 minutes and then wash off with water.
3. Decolourize with 5 per cent nitric acid for 15-30 seconds and wash with water.
4. Decolourize with 70 per cent alcohol for 15-30 seconds and wash with water.
   If smear still appears red, repeat decolourization.

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5. Counterstain with 0.5 per cent aqueous malachite green (or with methylene blue).

NOTE: We have found that the stock basic fuchsin with Tween added is stable for at least 3 months.

We continued to use the Ziehl-Neelsen as a standard for several months while duplicate smears were being tried with the propylene-glycol stain and/or with the Tween stain. The observations made are summarized in the table.

Comparative Series	Totals	Missed by One Method	Remarks
Propylene-Glycol & Z-N (Lab. 1)	1613	P-G - - 7 Z-N - - 4	2 atypical strains included in P-G misses
Propylene-Glycol Tween Stain & Z-N (Lab. 1)	1220	P-G - - 3 T-S - - 2 Z-N - - 4	T-S cleaner & rods stained darker than P-G
Tween Stain & Z-N (Lab. 2)	350	None	No difference in quality of staining
Propylene-Glycol & Tween Stain (Labs. 1 & 2)	891	None	Tween Stain preferred in both labs.

During the course of our routine work, 12 non-pathogenic strains of *Mycobacteria* turned up: 6 from gastric lavages, 5 from urines and one from a sputum. These strains stained equally well with Z-N and with the Tween stain. We have also tried known bovine, avian and frog strains kindly supplied by Professor Edouard Morin of Laval University together with other strains including B.C.G. supplied by Professor Armand Frappier of the University of Montreal. The results using Z-N and Tween stains were indistinguishable except in the case of the frog strain which showed only isolated red granules in the rather long rods stained by the counter-stain.

On the basis of our observations we feel that the Tween stain is quite satisfactory for routine use.

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ABSTRACTS OF PAPERS PRESENTED AT THE SEVENTEENTH ANNUAL CHRISTMAS MEETING OF THE LABORATORY SECTION, CANADIAN PUBLIC HEALTH ASSOCIATION, ROYAL YORK HOTEL, TORONTO, DECEMBER 16-17, 1949

Laboratory Studies on the Variations in the Antigenic Response to Diphtheria Toxoid.

D. R. E. MacLEOD and G. G. WATERS, *Connaught Medical Research Laboratories, University of Toronto.*

THE antigenic response in guinea pigs to various preparations of diphtheria toxoid was measured by the survival after a challenge dose of diphtheria toxin. The results indicate that:

1. When small amounts of tetanus toxoid are given with diphtheria toxoid in a single dose, there is no increase in antigenicity. With large amounts of tetanus toxoid some increase is noted when given in combined form but none when given at the same time but at separate sites.

2. When quantitative comparisons of the antigenic response to single doses of alum phosphate toxoid, regular alum toxoid and fluid toxoid were made, it was found that the response per Lf was best with the alum phosphate toxoid and poorest with the fluid toxoid.

3. Fluid toxoid when given daily in divided doses induced a better antigenic response than the same total amount of antigen (measured in Lf's) given as a single dose in the form of alum precipitated toxoid.

Phenol and Merthiolate as Preservatives for Diphtheria Toxoid.

L. GREENBERG and MARION DETLOR, *Laboratory of Hygiene, Department of National Health and Welfare, Ottawa.*

IT HAS BEEN generally accepted for many years that phenolized toxoids deteriorate rapidly in antigenic potency, whereas merthiolated toxoids do not. It is not clear how these beliefs originated for there is little convincing evidence in the literature to substantiate either of them. To obtain further data, a series of experiments were started using these preservatives in diphtheria toxoid. Convincing evidence was produced to show that phenol markedly depresses the antigenic efficiency of diphtheria toxoid, whereas no depression was noted in merthiolated toxoid stored for over two years.

Snail Control with the Delta Isomer of Benzene Hexachloride.

B. M. McCRAW, *Department of Parasitology, Ontario Veterinary College, Guelph, Ontario.*

PRELIMINARY OBSERVATIONS are reported upon the molluscacidal action of the delta isomer of benzene hexachloride upon snails indigenous to Ontario. With certain modifications, the methods of conducting laboratory tests used by Halawani in Egypt were followed. Snails used in the experiments were *Helisoma Trivolvis, H. anceps, Physa gyrina* and *Fossaria spp.* Twenty-four hours' exposure in 5, 10 and 20 p.p.m. of the compound caused partial or complete paralysis of all snails. Transfer to untreated water for 12 hours resulted in the revival of 94 per cent of the snails. Two point five p.p.m. of the chemical had no appreciable effect. The study of molluscacides has been initiated to find a chemical suitable for controlling snail intermediate hosts of trematodes but which is at the same time harmless to game fish.

The Structure of Bacterial Spores.

C. F. ROBINOW, *University of Western Ontario, London, Ontario.*

TREATMENT with N/1 HNO_3 or N/1 HCl (but not N/1 H_2SO_4) for 10 to 30 minutes at room temperature renders bacterial spores non-refractile and reveals their structure. N/3 HCl is ineffective by itself, but when mixed with 0.1 per cent potassium permanganate the action on spores is rapid. Using this reagent, the interior of spores may be stained after a few minutes' treatment at room temperature. In this mixture permanganate can be replaced by small amounts of water saturated with chlorine. Sodium fluoride, 0.3 to 0.6 per cent, added to the acids or their mixtures with permanganate or chlorine, inhibits the striking effect which these reagents have on bacterial spores.

The following structures may be seen in spores treated by the above methods. Close to the surface there is a refractile Feulgen-positive body, which stains deeply with crystal violet or Giemsa solution, and is readily digested by trypsin. Its staining properties and its behaviour during germination suggest that the peripheral structure is the nucleus of the spore. The cytoplasm is differentiated into a basophilic but Feulgen-negative core surrounded by a clear, faintly staining layer.

Trichinosis in the Canadian North.

ELLA KUITUNEN-EKBAUM, *Connaught Medical Research Laboratories, University of Toronto.*

MUSCLE SAMPLES of 416 animals from N.W.T. and P.Q. were examined for trichinosis. These included 29 bearded seals (*Erignathus barbatus*), 3 polar bears (*Thalarctos maritimus*), 28 harp seals (*Phoca groenlandica*), 244 jar seals (*Phoca hispida*), 47 walrus (*Odobaenus rosmarus*), 14 white whales (*Delphinapterus leucas*), 4 dogs, 1 fox (*Alopex lagopus*), 25 arctic hares (*Lepus arcticus*), and 21 lemmings (*Dicrostonyx groenlandicus*). *Trichinella spiralis* larvae were found in 2 polar bears and 2 dogs. One infected polar bear was shot at Cornwallis Island and the other at Sugluk, P.Q. The muscle samples of the trichinous dogs were sent from Devon Island and Sugluk.

Laboratory Investigation of the Poliomyelitis Outbreak at Chesterfield Inlet, N.W.T.

A. J. RHODES, EINA M. CLARK, ALICE GOODFELLOW and W. L. DONOHUE, *Connaught Medical Research Laboratories and Department of Pathology, Hospital for Sick Children, Toronto, Ontario.*

SEVERAL PATHOLOGICAL SPECIMENS were received from Eskimos involved in the epidemic of poliomyelitis at Chesterfield Inlet, N.W.T. The following 7 samples were selected for examination: brain and cord from 2 patients; stools from 3 cases; and throat washings from 2 cases. After suitable treatment, inoculations were made cerebrally and peritoneally in rhesus monkeys. Animals were killed when signs of poliomyelitis were first noted, or after 4 weeks; in all cases, the diagnosis was based on histological examinations. Poliomyelitis virus was isolated from both the autopsy specimens, 2 of the 3 stools, and 1 of the 2 throat washings. The laboratory tests establish beyond reasonable doubt that the epidemic described was, in fact, one of poliomyelitis.

A Preliminary Report on Nocardia Complicating the Diagnosis of Tuberculosis.

G. G. KALZ, *Department of Bacteriology and Immunology, McGill University, Montreal, P.Q.*

INFECTIONS caused by acid-fast species of *Nocardia* have been reported in the literature,

although not very frequently. Most of the reported cases had a fatal outcome and in many cases the infection was not diagnosed until autopsy. The majority of the reported infections involved the lungs or the central nervous system and in the latter were usually metastatic from primary lung infections.

Clinically and pathologically the infections resemble tuberculosis very closely, and possible confusion with tuberculosis has been emphasized by several workers. It also has been assumed that infections with acid-fast *Nocardia* are more common than the reports might suggest, but are not diagnosed.

Most of the reported cases have been due to *Nocardia asteroides* and a few to other species. The strains are described as "weakly" acid-fast and do not survive treatment with NaOH. Pathogenicity for animals seems to be extremely variable.

The case observed by us presented a serious diagnostic problem. Studies of the isolated organism which we place in the genus *Nocardia* are still incomplete. It differs from most recognized species of *Nocardia* in two important points, namely, our strain survives treatment with 4 per cent NaOH (30 minutes to 1 hour) or with trisodium phosphate overnight and it is as acid-fast as the tubercle bacillus, and not decolourized by 25 per cent sulfuric acid or hydrochloric acid and alcohol. It utilizes paraffin as sole source of carbon and grows on media containing 0.5 per cent phenol. It branches consistently and grows on Sabouraud's medium at room temperature. It is not pathogenic for guinea pigs, rabbits, chickens or mice if inoculated in the concentrated specimen. (Studies on the organism will be reported in detail elsewhere.)

The main reason for presenting the case here is to draw the attention of the members to this type of organism. Mass radiography classifies many people as "tuberculosis suspect" and if smears alone or even smears and cultures are used for confirmation, the occurrence of this species of *Nocardia* in sputum and/or gastric washings may give rise to serious errors in diagnosis.

Properties of Streptomycin-Resistant Tubercle Bacilli and their Demonstration on Oleic Acid Albumin Agar Medium.

CHARLES O. SIEBENMANN, *Connaught Medical Research Laboratories, University of Toronto.*

In determining the virulence of a number of human strains of *M. tuberculosis* by subcutaneous inoculation of guinea-pigs, no very marked differences could be found between two streptomycin-resistant and four streptomycin-sensitive strains.

In vitro experiments are presented which confirm the existence of marked differences between various strains of *M. tuberculosis* with regard to their ability to develop streptomycin resistance.

The question as to whether *in vitro* resistance to streptomycin is a true indication of *in vivo* resistance to streptomycin therapy was explored in the case of a guinea-pig infection induced by means of a partially resistant strain. A control group, infected with the corresponding streptomycin-sensitive strain, was given the same streptomycin treatment. Although the treatment proved very effective for this control group, all animals infected with the partially resistant strain died, showing essentially the same degree of tuberculosis as observed in a group of untreated animals.

Cultures, isolated from treated and untreated animals, were tested for streptomycin sensitivity using Tween albumin fluid medium and, for comparison, oleic acid albumin agar containing graded amounts of streptomycin. Some advantages of the oleic acid albumin agar over other media are discussed.

No cultures showing streptomycin resistance were isolated from streptomycin-treated guinea-pigs infected with the streptomycin-sensitive strain, whereas in the case of the infection induced by the partially resistant strain, cultures showing various degrees of resistance were recovered.

Para-Aminosalicylic Acid and the Development of Tubercle Bacilli Resistant to Streptomycin.

(a) In vitro studies—

G. H. HAWKS, *Department of Pathology and Bacteriology, University of Toronto.*

THREE STRAINS of human tubercle bacilli isolated from patients with tuberculosis were exposed to sub-inhibitory amounts of streptomycin, Para-aminosalicylic acid (PAS) and a combination of the two in Dubos' fluid medium. The rapidity with which the strains developed resistance to streptomycin or PAS was determined.

All three strains transferred in media containing streptomycin alone became resistant to the drug, whereas the same strains carried in media containing 0.1 micrograms of streptomycin and 0.005 mgm. of PAS did not develop resistance to streptomycin, but one of the three became resistant to PAS. With other bacteria (*E. coli*, Friedlander's bacillus, etc.) the combination of streptomycin and PAS did not affect the development of streptomycin resistance.

(b) In patients with Tuberculosis—

W. ANDERSON, *Toronto Hospital for Tuberculosis, Weston, Ontario.*

TWO GROUPS of patients with tuberculosis have been studied. Both received 1 gram of streptomycin per day for 60/90 days. In addition to this therapy one group of patients received 10 grams of PAS each day given by mouth as the sodium salt.

Cultures for tubercle bacilli were made each month throughout and for six months after therapy had been discontinued. Following primary isolation on Loewenstein's medium, tests for sensitivity for streptomycin were conducted on Herrold's egg-yolk medium. All pre-treatment cultures were sensitive to streptomycin (growth inhibited by 5 micrograms per c.c. of culture medium).

In 88 out of 160 patients treated with streptomycin alone it was possible to isolate tubercle bacilli before and after therapy. Sensitivity tests on the post-treatment cultures showed 41.6 per cent (37 cases) to be completely resistant (growth in the presence of 50 micrograms per c.c. of medium); while in 37.7 per cent (33 cases) there was no significant change in sensitivity; the remaining 18 cases occupied an intermediate position.

Of the patients treated with streptomycin and PAS it has been possible to isolate tubercle bacilli before and after therapy in 19 instances. None of the post-treatment cultures was found to be completely resistant. There was no significant change in sensitivity in 79 per cent (15 cases); the remaining 4 cases showed a slight increase in resistance to streptomycin.

The Use of Tri-sodium Phosphate in Techniques for the Isolation of M. tuberculosis.

HUGH STARKEY, M.D., and E. AUBERT, B.A., B.C., *Ste. Anne's Veterans Hospital, Ste. Anne de Bellevue, Quebec.*

See page 27 for complete article.

"Cold" Stain for Acid-Fast Bacteria.

E. AUBERT, B.A., B.C., *Bacteriologist, Ste. Anne's Veterans Hospital, Ste. Anne de Bellevue, Quebec.*

See page 31 for complete article.

Nasopharyngeal Carriers of Hemophilus Influenzae, Type "B", in Family Contacts.

O. E. LAXDAL, GRACE CRAIG and T. E. ROY, *Department of Pathology, Hospital for Sick Children, Toronto, Ontario.*

NASOPHARYNGEAL cultures from non-contacts and contacts were examined for *H. influenzae*, type "b". Carriers were not found in non-contact adults or children, but 20 per cent of individuals were positive in families where recent severe infection had occurred. In an overcrowded housing project where cases were occurring 4 per cent were positive.

Three Cases of Bubonic Plague in Humans in New Mexico.

MYRTLE GREENFIELD, *New Mexico Public Health Laboratory, Albuquerque, New Mexico.*

THREE CASES of human plague have recently occurred in New Mexico. In 1894 Kitasato and Yersin, working independently, isolated and described *Pasteurella pestis*, the organism producing plague. Bubonic plague has long been associated with domestic rats. In 1906 and 1907 the Indian Plague Commission found the rat flea to be the vector transmitting the infection from the rat to man.

The first case of plague demonstrated in the United States was that of a Chinese in San Francisco, March 6, 1900. Between 1900 and 1904, San Francisco had 120 cases of plague and 114 deaths. These were in Chinatown, and an epizoötic among rats was in progress at the same time. A drastic rat eradication program was developed, and no more cases were reported until 1907, when there were 178 cases with 87 deaths. The 1906 earthquake and fire nullified the rat eradication program.

In 1908 plague was demonstrated in ground squirrels near San Francisco. This was the first proof that the infection had spread to wild rodents in California.

In 1919 there was an outbreak of pneumonic plague in Oakland, California, where there were 13 cases and 13 deaths. A second outbreak occurred in Los Angeles in 1924 where there were 33 cases of pneumonic plague with 31 deaths. In both episodes wild rodent infection was the most probable source of the first case.

Since 1900 there have been 516 cases of plague in the United States with 339 deaths. In the last 25 years, there have been 26 cases with 14 deaths. Since there was on the average only one case per year during the last 25 years, it would seem that the problem is well under control until one studies the reports of the U. S. Public Health Service and learns of the rapidly expanding areas in which plague-infected wild rodents and ectoparasites have been found.

In 1908 the U. S. Public Health Service began a study of the spread of plague infection in wild rodents. Since 1908 infected rodents have been found in 15 western states. This spread has gradually extended from the Pacific coast eastward, and the infection has now been demonstrated in those states cut by the 100th meridian.

Since it is impossible to eradicate wild rodents, we must accept the fact that we have in the wild rodents in the United States a reservoir of plague infection. As long as the reservoir of infection is in the wild rodent, we could expect only a few cases, and those widely scattered. As plague in wild rodents spreads eastward, there will be more and more possibility of domestic rats becoming infected from wild rodents. If an epizoötic of plague in the domestic rats was established, many human cases might occur, although modern methods of sanitation and of medical care would prevent a repetition of pandemics of history.

A drastic rat eradication program should be instituted. A break in the chain of the transmission of the infection from rat to man may be accomplished in part by dusting rat runways and rat harbors with an insecticide. Adults and children should be educated relative to the care necessary to avoid contact with the wild rodent and his parasites and particularly to be on the alert for sick animals.

Interference Between Certain Neurotropic Viruses and Transplantable Mouse Tumors.

HILARY KOPROWSKI and THOMAS W. NORTON, *Section for Viral and Rickettsial Research, Lederle Laboratories Division, American Cyanamid Company, Pearl River, N.Y.*

MICE BEARING transplantable Crocker Sarcoma 180 tumors were inoculated parenterally with mouse-brain suspension infected with various neurotropic viruses. After signs of illness appeared, the tumors were measured, the animals were sacrificed and the tumor tissue removed. Portion of the neoplastic tissue was triturated and titrated in mice, and a part was used for bioassay by subcutaneous transplantation into mice.

Apart from the Russian spring-summer encephalitis virus, as previously reported by Moore, the following viruses have shown marked affinity for tumor tissue as judged by LD_{50} titres in mice: Louping-ill, West Nile, St. Louis, Japanese B and Ilheus encephalitis, Bunyam-Wera and Venezuelan equine encephalomyelitis. The louping-ill virus equalled the Russian spring-summer encephalitis virus in its oncolytic properties since none of the louping-ill infected tumors remained viable as judged by total failure of the bioassay. Partial but definite oncolytic activity was also observed in tumors infected with West Nile, St. Louis, Ilheus, encephalitis and Venezuelan equine encephalomyelitis viruses.

The anti-tumor action of the West Nile encephalitis and Venezuelan equine encephalomyelitis viruses was further demonstrated, although as yet a statistically significant number of experiments still has to be performed, against the following mouse tumors: Lymphosarcoma, Wagner osteogenic sarcoma, Ridgeway osteogenic sarcoma and carcinoma EO 771.

Bacteriophage Typing in the Province of Quebec.

J. M. DESRANLEAU and IRENE MARTIN, *Division of Laboratories, Ministry of Health, Montreal, P.Q.*

SINCE SEPTEMBER 1, 1941, 5,231 cultures of *Salmonella typhosa* from specimens taken from 2,613 persons in the Province of Quebec have been examined by bacteriophage typing.

New sub-types which do not appear in the series of bacteriophages distributed by Doctors Craigie, Edwards and Felix have been identified. These sub-types are of demonstrated epidemiologic value.

Since 1943, at least 49 different strains of Vi phages of *S. typhosa* have been isolated. Suggestion is made for a study of other strains of type II phage, in order to search for another strain, which might yield preparations the reactions of which would be more specific than those of the preparations distributed at present throughout the world.

Since 1944, 520 cultures of *S. schottmuelleri* from 277 persons have been examined with the bacteriophages of Dr. A. Felix of England. All types but type 2 have been found in the Province of Quebec.

For over one year, work has been done on phage typing of staphylococci, especially in food poisoning, with the bacteriophages furnished by Dr. V. D. Allison of London, England. No report is yet available.

A Bacteriophage for C. diphtheriae.

SHEILA TOSHACH, *Department of Hygiene and Preventive Medicine, University of Toronto.*

A SEARCH for specific bacteriophages active against *C. diphtheriae* has revealed only one such phage from 100 cultures tested thus far. This phage is active against one *mitis* strain only, on which it gives confluent lysis at a dilution of $1{:}10^{-3}$. Attempts to increase the potency of the phage and to adapt it to other strains are being pursued. An electron microscope photograph showing the size and morphology of the phage is presented.

More Observations of the Effect of 2,4-Dinitrophenol on Escherichia coli Infected with Phage T-2.

FRED. C. HEAGY, *Department of Biochemistry and Department of Bacteriology and Immunology, University of Western Ontario, London, Ontario.*

IT HAS BEEN REPORTED previously that lysis occurs almost immediately when cultures of *Escherichia coli* in nutrient broth or synthetic medium are simultaneously exposed to

inhibitory concentrations of 2,4-dinitrophenol (DNP) and infected with phage T-2r+ under conditions that cause multiple infection. No new phage is produced and the infecting phage is lost. Even without DNP, immediate lysis is observed when cultures are infected with phage T-2r+ in synthetic medium that lacks utilizable carbohydrate.

Recent investigations indicate that DNP also causes accelerated lysis under conditions of single infection with phage T-2r+. On the other hand, DNP completely inhibits lysis of *E. coli* infected with either phage T-2r or phage T-1.

The effect of varying the relative time of addition of DNP or of phage T-2r+ to the cultures was investigated, under conditions designed to produce multiple infection. Usually, cultures that had been effectively inhibited by DNP were not lysed when phage T-2r+ was added later. When the cultures were infected with phage T-2r+ first and then inhibited with DNP, the result depended on the time interval between infection and addition of DNP. There was an interval during the latent period of phage growth during which the infected cells resisted lysis when DNP was added. But, as the end of the normal latent period approached, the cultures again became sensitive to accelerated lysis by DNP, as if DNP were preventing the "lysis-inhibiting" action of the r+ factor.

It has been found that *E. coli* which have been grown in Difco Tryptose Broth do not lyse following simultaneous inhibition by DNP and infection with phage T-2r+.

The implications of these observations are discussed.

Fascioloides magna in Ontario.

A. A. KINGSCOTE, *Department of Parasitology, Ontario Veterinary College, Guelph, Ontario.*

A REPORT is made on the incidence of the large American liver fluke, *Fascioloides magna*, in Ontario. Field and laboratory survey methods are described. Hosts for the parasite in the Province were ascertained to be cattle, buffalo, sheep, elk, deer and moose. During the summer of 1949, *F. magna* was located in twenty-two townships in eleven counties or districts.

Comparative Studies of the Complement and Coagulative Activity of Dicumarol-Treated Guinea Pigs.

PAUL BOULANGER and CHRISTINE E. RICE, *Division of Animal Pathology, Dominion Department of Agriculture, Animal Diseases Research Institute, Hull, P.Q.*

AS A PART of a larger investigation of the possible relationship between certain elements of these two complex blood systems, coagulation and complement-fixation, a comparative study was made of these two properties in the blood of 15 dicumarol-treated guinea pigs. An equivalent number of untreated guinea pigs served as controls. Tests of prothrombin activity of these plasmas were made by three methods, those of Quick, of Howell, and the Mawson modification of the two-stage method of Warner, Brinkhous and Smith. After 15 daily doses of dicumarol, 14 of the 15 guinea pigs showed definitely increased clotting times as determined by the two-stage method. The two other methods were less sensitive in detecting prothrombin decrease. Parallel tests of sera collected at the same time showed the complement titres of the dicumarol-treated and normal animals to fall within the same range. Titration of the four major complement components C'1, C'2, C'3 and C'4, in these sera, did not reveal any consistent differences in their relative concentration which could be traced to the dicumarol treatment. It seems evident therefore that a marked decrease in the prothrombin content of guinea-pig blood may occur without being reflected in any appreciable changes in complement activity.

Two Cases (One Fatal) of Type E Botulism from Home-Pickled Herring.

C. E. DOLMAN, HELEN CHANG, DONNA E. KERR and A. R. SHEARER, *Connaught Medical Research Laboratories (Western Division); Division of Labora-*

tories, Department of Health of British Columbia; and Department of Bacteriology and Preventive Medicine, University of British Columbia, Vancouver, B.C.

ONE MAN DIED, and another recovered in a Vancouver hospital, from clinically typical botulism following consumption of a jar of uncooked herring, pickled in vinegar and spices by the latter's wife 5 days prior to the fatal meal. From a fragment of herring bone retrieved from the garbage can, *Cl. botulinum* type E was isolated.

An apparently identical strain was isolated from gastric and jejunal contents taken at autopsy, and the presence of type E toxin in the jejunal contents was also demonstrated. This strain differed in some respects from the type E strains isolated from the 1944 Nanaimo outbreak.

The herring had been caught in salt water some weeks prior to pickling. During most of this period they were kept in a deep-freeze locker. The possible mechanisms of toxin production in the herring are discussed, with special reference to the possibility that the original source of the micro-organism was the enteron of the fish.

The Reproductive Mechanism of Rhodomicrobium vannielii and the Accompanying Nuclear Changes.

R. G. E. MURRAY, *University of Western Ontario, London, and* H. C. DOUGLAS, *University of Washington, Seattle.*

RHODOMICROBIUM VANNIELII is a photoheterotrophic, anaerobic organism isolated from mud. The organism resembles the non-sulfur purple bacteria in physiological properties but it is so different from these in morphology and reproductive mechanism that a taxonomic problem is posed.

R. vannielii produces daughter cells at the end of a filament. These filaments remain as connecting links between the mature cells and are produced from either the pole of the parent cell or the filament connecting two mature cells. A cross wall is found in the connecting filament and separates the protoplasm of mature cells. A reproducing cell forms, generally, one daughter cell at a time. This means of reproduction, which resembles budding, leads to the production of ramifying groups of cells connected by filaments.

The mature cells of *R. vannielii* possess a single nucleus that may be demonstrated by the methods used to show bacterial nuclei. When a new filament is produced, the nucleus consists of two distinct elements. At an early stage of development the daughter cell acquires a chromatinic element, at which time the parent cell is seen to have a single nuclear structure.

A Comparison of the in vitro Effects of Fifteen Antibacterial Agents, Including Antibiotics, on Some Organisms Commonly Infecting the Urinary Tract.

A. E. LARNER and C. W. J. ARMSTRONG, *Laboratory of Hygiene, Department of National Health and Welfare, Ottawa, Ontario.*

WITH A VIEW to improving methods of combating troublesome bacterial infections in the urinary bladders of patients by irrigation, etc., a study of the *in vitro* effect of 15 antibacterial agents on 6 common pathogens of the human bladder was made. The organisms used were: *Ps. aeruginosa, S. aureus, Strep. faecalis, E. coli, Al. faecalis,* and *P. vulgaris.* The 15 drugs investigated were nitrofurazone (Furacin), sulphanilamide, tyrothricin, aureomycin, chloramphenicol (Chloromycetin), polymyxin D, 2:8 diamino-acridine sulfate (Proflavine), penicillin G, dihydropenicillin F, methenamine mandelate (Mandelamine), Phemerol, bacitracin, streptomycin and dihydrostreptomycin.

The organisms were exposed to at least two concentrations of these drugs in broth for periods of 3 and 24 hours. As some of these drugs are known to show optimum activities at particular hydrogen ion concentrations, these studies were conducted at pH's 5, 6, 7 and 8. Initially, rough screening of antibacterial activity using agar slants was attempted in order to gain an approximate idea of optimum effect. For a more precise evaluation of the action

of these drugs, plate counts were made on aliquots of diluted broth cultures. Finally, the effect of human urine and serum protein on the action of these drugs was studied.

Three of the drugs, Mandelamine, Proflavine, and Tyrethricin, were outstanding in inhibiting each of the 6 organisms. Further studies include combinations of drugs and interpretation of the effects of exposure time and drug concentration. It is proposed to follow up the more favourable results with an investigation of the clinical application of these drugs.

Some Antibiotics Produced by Micrococci.

L. J. LOEB, *University of Western Ontario, London, Ontario.*

FIVE OF 158 STRAINS of *Micrococcus pyogenes* var. *aureus* and two of 47 strains of coagulase-negative micrococci have been shown to produce antibiotics. These organisms were surveyed by the streak method on blood agar plates, using a mucoid *Streptococcus pyogenes* to test activity. Inhibitory strains were tested against other organisms in the same fashion. Four types of antibiotics have been characterized on the basis of production, dialysis, stability and antibacterial spectrum. All four showed selective activity among Gram-positive bacteria but no activity against any of the Gram-negative organisms tested. A stable antibiotic was produced by a coagulase-negative *Micrococcus*. It is believed to be polypeptide in nature.

Sero-Diagnosis and Treatment of Syphilis in the Remote Northern Areas of Saskatchewan.

W. A. RIDDELL, *Division of Laboratories, Provincial Department of Public Health, Regina, Sask.*

SINCE IT IS impossible to have blood specimens shipped out from the remote areas to the laboratories for sero-diagnostic tests, a laboratory team has been sent into the far north of the province during the past two years for sero-diagnosis of syphilis in the Indian, Metis and whites. The team accompanied the Treaty Party. This laboratory team is fully equipped to carry out the Kahn tests in the field. A minimum of equipment is required and the electric generator used by the X-ray unit from the T. B. League, which also accompanies the Treaty Party, is used as a source of power. In 1948, 792 persons from three areas were examined and in 1949, 1200 persons from eight areas were examined. The incidence of syphilis varied tremendously from band to band, in some instances reaching 23.1 per cent of the population and in others being as low as 0.23 per cent. In the past, Treaty Indians have been treated by the Department of Indian Affairs. This year, the V. D. control officer for the province undertook the treatment of Indians and Metis alike, as a follow up to the survey. It is expected that this will be a continuing program.

Influenza at Cambridge Bay, N.W.T.

F. P. NAGLER, C. E. VAN ROOYEN, and J. H. STURDY, *Laboratory of Hygiene, Department of National Health and Welfare, Ottawa; and Connaught Medical Research Laboratories, University of Toronto.*

AN EPIDEMIC of virus influenza in the Eskimo population of the southern regions of Victoria Island, N.W.T., caused an attack rate of 100 per cent and a case fatality rate of 20 per cent. The majority of deaths occurred in Eskimos who had received no medical treatment. Penicillin and sulphadiazine appeared to have been of great value in preventing secondary infections and further deaths. The white population of this Island was relatively unaffected by the epidemic and medical treatment was required in only one case.

Influenza virus, type A, has been isolated from the throat washings of the Eskimo patients and from the various organs and heart blood of fatal cases.

The Interchangeability of the Complement Components of Different Animal Species in Hemolysis and Conglutination.

CHRISTINE E. RICE and C. N. CROWSON, *Division of Animal Pathology, Dominion Department of Agriculture, Animal Diseases Research Institute, Hull, P.Q.*

FRESH SERA of some 14 animal species have been titrated for relative content in the four recognized complement components, C'1, C'2, C'3 and C'4. All four components of guinea pig, human and hamster were found to be mutually interchangeable in the hemolytic reaction. C'1 and C'2 of human and swine and of hamster and cat could also be substituted for each other. Guinea pig C'2 functioned with C'1 of swine, cow, cat, rabbit, horse, sheep, deer and mouse provided C'3 and C'4 were present in sufficient quantities. Swine C'2 had a somewhat narrower range of interreaction. The C'3 component of most animal species replaced that of another in hemolysis. C'4 appeared to be absent from, or present in very low concentration in, sera of several species; its lability made the interpretation of certain experiments on interchangeability difficult.

In the conglutination reaction, the C'1 component of bovine complement and the C'2 component of horse complement had the broadest activity. The former played a dual role; when mixed with C'2 of guinea pig it functioned in hemolysis, whereas in mixture with C'2 of horse, conglutination resulted. Horse C'2 produced conglutination with C'1 of human, cow, sheep, rabbit, swine, deer and hamster; cat C'2 was compatible with C'1 of a more limited number of species. Swine serum when fresh was both hemolytic and conglutinative; the former property, which was lost rapidly on storage, was restored by the addition of heated guinea pig serum, supplying C'3 and C'4. Whereas the presence of all four complement components is essential for hemolysis, the experimental evidence suggested that C'4 may not be required for conglutination or that at least much smaller amounts are needed than for hemolysis.

The complement components of different animal species differ greatly in stability, heat sensitivity and relative anti-complementary properties, hence all data indicating a lack of interchangeability on the part of any given complement component must be interpreted with due recognition of the fact that conditions for optimal functioning of one system are not necessarily optimal for another system.

Relative Sensitivity of Hemolytic and Conglutinating Complement-Fixation Tests.

CHRISTINE E. RICE, R. G. AVERY and JOAN TAILYOUR, *Division of Animal Pathology, Dominion Department of Agriculture, Animal Diseases Research Institute, Hull, P.Q.*

SEVERAL DIFFERENT antigen-antibody systems have been tested in parallel in hemolytic and conglutinating complement-fixation tests using horse and guinea pig complements respectively. The two methods appeared of about equal sensitivity in titration of mallein antigens with mallein antisera prepared by the repeated injection of this material in horses. The dilution titres of various types 1, 2, 3 and 8 antipneumococcus rabbit sera with homologous type specific carbohydrate determined by the two methods were very similar. In titrations of serial dilutions of carbohydrate with constant quantities of antiserum, the zones of maximal fixation coincided closely in the two tests. Brucellosis bovine sera had definitely higher dilution titres with *Brucella abortus* suspensions in the conglutinating than in the hemolytic complement-fixation test. Unfortunately this higher sensitivity was accompanied by a relatively greater degree of "nonspecificity", since a number of normal bovine sera in dilutions up to 1:80 showed fixation of horse complement. Thus as reported by Coombs and Hole (J. Hyg., 1948, *46:* 298), antisera from different animal species varied considerably in their relative fixability with horse complement. Certain systems that have been repeatedly shown to lack fixability for guinea pig complement, notably antipneumococcus horse serum with the corresponding type specific carbohydrate, and various avian antisera with homologous antigens, also failed to fix horse complement. This was disappointing in that it had been

hoped that the conglutinating complement-fixation test might be of practical value particularly with the avian antisera. The investigation of the usefulness of this test is now being extended to certain other antigen-antibody systems non-reactive in hemolytic complement-fixation tests.

Technically the conglutinating complement-fixation test is somewhat more difficult to standardize than the hemolytic type of test mainly due to the greater instability of the horse complement. Comparative studies, however, have indicated that the quantitative relationships between the various reagents correspond closely in the two tests, suggesting a basic similarity in the two reactions.

A Bacteriophage for Mycobacterium smegmatis.

ELIZABETH WHITTAKER, *Department of Hygiene and Preventive Medicine, University of Toronto.*

A SOIL ENRICHMENT experiment using three different species of mycobacteria has yielded several bacteriophages. The bacteriophage described is active against two strains of *M. smegmatis* and No. 607 American Type Culture Collection but inactive for two strains of *Mycobacterium phlei*. It produces confluent lysis at a dilution of 10^{-4}. The size and morphology of this phage is shown in an electron microscope photograph.

Recall Dose of Tetanus Toxoid by the Intranasal or Intraocular Route.

F. O. WISHART and L. KATHLEEN JACKSON, *Department of Hygiene and Preventive Medicine and Connaught Medical Research Laboratories, University of Toronto.*

USING A HIGHLY CONCENTRATED diphtheria toxoid introduced into the nostrils as drops, or on cotton wool pledgets, Fraser (1940)* demonstrated a marked rise in the antitoxin level in previously immunized children and adults. It seemed reasonable to suppose that tetanus toxoid would act as a secondary stimulus by the same route. Accordingly, four groups of 10 persons each, all previously immunized, were selected for test.

Blood was drawn from each volunteer and a concentrated tetanus toxoid of 90 Lf per c.c. (kindly provided by Dr. P. J. Moloney) was administered as follows:

Group I—by nasal spray to one nostril.

Group II—2 drops in each nostril.

Group III—by a cotton wool pledget in one nostril.

Group IV—2 drops in each eye.

In Groups I, II and IV, the amount of toxoid delivered was approximately 19 Lf. For Group III the pledgets were soaked with 38 Lf of toxoid in an attempt to correct for the amount remaining on the pledgets which were left in the nostril for only 15 minutes.

Blood samples drawn three weeks later gave the following results:

	Antitoxin Response		
Group	*Definite*	*Doubtful*	*None*
I	0	1	9
II	1	4	5
III	1	2	7
IV	1	1	8

In order to demonstrate that concentration of the antigen had not affected its antigenicity, 10 persons who had failed to respond in the above trials were given 19 Lf of the same material subcutaneously. All responded, a 10 to 100 fold rise in the antitoxin level being present at the end of 16 days.

The possibility of administering the recall dose of tetanus toxoid, with satisfactory results, by the intranasal or intraocular route would appear remote.

*Fraser, Donald T., Eric L. Davey and K. C. Halpern: Antitoxin Response to Concentrated Diphtheria Toxoid Applied to the Nasal Mucous Membrane, Canad. Pub. Health J., 1940, *31*: 376.

Canadian Journal of Public Health

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THE SHORTAGE OF PUBLIC HEALTH PERSONNEL

NO PROBLEM in public health today is more urgent than that of obtaining competent, well-trained personnel, in adequate numbers, to staff the public health departments. The problem becomes greater when the requirements of staff for the extension of public health services during the next few years are considered. Today's problem faces us. The problem of tomorrow will not be met unless there is careful planning now—planning which will give reasonable grounds for believing that trained personnel in adequate numbers will be available. Everywhere on this continent public health administrators are unable to fill vacancies for physicians with public health training, for public health nurses, engineers, and other personnel. In the United States, it was expected that returning members of the Services would fill many vacant positions and that post-graduate schools of public health and public health nursing would be taxed to capacity. It is true that many returning personnel from the Services have taken advantage of the opportunity to obtain post-graduate training in public health through the assistance granted in the plans to aid veterans, but the enrolment in the United States has been far below the number anticipated. In Canada, fortunately, it was possible for veterans desiring either undergraduate or graduate instruction to be accommodated in the universities without delay, so that today there is no back-log of veterans awaiting admission.

In regard to the availability of physicians with special training in public health to give leadership to the public health movement, the situation in Canada is definitely better than that in the United States. Since 1940, 249 physicians, including many who were with the Services, have obtained the Diploma in Public Health in Canada and there are 26 engaged in this post-graduate training. The great majority of these physicians are serving as medical officers of health in the various provinces. These facts are encouraging. When, however, the needs of the provinces, with their plans for the extension of services, particularly for rural areas, are considered, it is seen at once that the number of public health physicians available is entirely inadequate. A number of the provinces have been able to obtain the services of physicians from Great Britain and Ireland to fill public health positions. Though the situation in Canada is much better than that

in the United States, there are definite indications that the shortage of trained public health physicians will continue and is likely to become even more acute.

Turning to the nursing problem, there were 14,065 nurses serving in public health agencies in 1948. This was only 45 more than in 1946. In public health organizations across Canada, the greatest shortage of staff is in public health nursing. In every province the establishing of new health units has been handicapped, and often prevented, by inability to obtain public health nurses. There is an acute shortage of graduate nurses of all kinds. In an analysis of the nursing situation in Canada in 1947,[1] Miss N. D. Fidler, now director of the Metropolitan School of Nursing at Windsor, Ontario, pointed out that the real reason for the shortage of nurses is the vastly greater demand that has been developed during and since the war. There are many factors accounting for the increased demand, including the drastic reduction in domestic help, the employment of women in industry, and the increased ability of the public to pay for nursing services. It is true that today there are more pupil nurses in training in Canada than at any previous time, the number exceeding 13,000; but in spite of the larger number of nurses being graduated it is estimated that at least 8,000 more graduate nurses are needed. This does not take into account the additional number required to service the 15,000 hospital beds already authorized under the Dominion's Hospital Construction Grant. This number would be not less than 3,000 graduate nurses and there would be needed also the auxiliary nursing personnel.

To a lesser extent, what has been said of the shortage of physicians and public health nurses applies also to other essential personnel, including engineers, veterinarians, bacteriologists, statisticians, and sanitary inspectors. The provincial departments of health are seriously concerned about the situation. The Dominion Council of Health, the advisory body to the Department of National Health and Welfare, has stressed the necessity for a Dominion-wide approach to the problem and has asked the Canadian Public Health Association to assist in the development of plans designed to meet it, particularly in long-range planning. The Association's survey of public health practices, conducted by Dr. J. H. Baillie and Miss Lyle Creelman, will be most valuable as a background. The Association's report,[2] too, on recommended minimum salaries for public health personnel is an important contribution the implementing of which would mean much to the solution of the problem of obtaining the desired personnel.

Immediate improvement in the situation cannot be expected. Plans must be made now, the results of which may not be evident for some years. For example, the needs of a number of the provinces for public health physicians to serve in rural and outlying areas might be met by introducing a long-term plan in which promising high-school graduates desiring to obtain medical training and to serve in public health would be financially assisted by the Provincial Government. These graduates would be familiar with the towns and countryside of the province

[1]Fidler, N. D.: Supply and Demand in Nursing. This Journal, 1947, *38:* 509.
[2]Recommended Qualification Requirements and Minimum Salaries for Public Health Personnel in Canada. This Journal, 1949, *40:* 143.

and would be able to render a service that physicians coming from outside the province could not give. Such a plan for the training of physicians to serve in general practice has been in effect in Newfoundland for the past five years. In several of the Western Provinces, the Departments of Agriculture have subsidized the training of those who desired to obtain training in veterinary medicine at the Ontario Veterinary College and who would return to their province to practise. Such a plan to provide public health physicians might be equally successful.

The provision of professional training grants by the Dominion Government has already made an important contribution to the solution of the problem. In the first year of the National Health Grants the sum of $500,000 which was made available was completely used. This indicates that there is an urgent need for financial assistance to aid those who desire to enter the public health field but who cannot personally meet the cost of the necessary training.

Plans for the interesting of high-school graduates in the field of public health, for the presentation of the opportunities to undergraduate medical, dental and other students, and for the enrolment of larger numbers in graduate schools of public health and public health nursing are all to be commended. During the war the Canadian Nurses Association was eminently successful in interesting many young women graduating from high school to train in nursing. This program has been continued as far as it is now possible. The Canadian Dental Association is presenting the field of dentistry. In medicine, there are many more students seeking entrance into the colleges of medicine than can be accommodated. However, many of those entering are from large urban centres and are planning to practise in cities. Few, on entering, have a knowledge of the public health field, and consequently the staffing of health departments will continue to be difficult until more students enter the medical college with a career in public health in mind.

In such efforts, outlines of public health work, the presentation of the need, and statements of the opportunities for service, given in addresses or issued in printed form, are of value. They can, however, never approach in value the demonstration of effective public health work by individual members of health departments as presented in the regular conduct of their duties. They, to a great degree, hold the answer to the problem. If their work is not effective, young persons will not become interested in public health, and all efforts to inform them of the opportunities and the needs will be of little value. The Canadian Public Health Association has before it a great opportunity to assist in meeting Canada's no. 1 public health problem.

CANADA'S SIXTH NATIONAL HEALTH WEEK

THROUGHOUT CANADA from January 29th to February 4th, newspapers, magazines and many other publications will announce the week as Canada's "National Health Week". It will be the sixth successive year in which this Week, sponsored by the Health League of Canada, has been held to emphasize the value of good health, personal and communal.

The statistics of National Health Week are striking. Hundreds of newspapers, dailies and weeklies, contribute thousands of dollars' worth of advertising space to the publication of articles supplied to them by the Health League on almost every aspect of public health work. From this standpoint alone the contribution made by the League justifies all the effort that is involved in the successful conduct of this campaign.

In addition to the publication of articles, provision is made to carry the program into the schools. To this end, a booklet entitled *Health Facts,* published in English and French, is offered to school teachers, supplying facts concerning the pasteurization of milk, nutrition, social hygiene, industrial health, and a number of health problems. For school children an attractive booklet, *Guardians of our Health,* has been made available. Radio stations throughout Canada are co-operating in the program. National Health Week is being increasingly appreciated and it is recognized as a very valuable contribution to the promotion of public health in Canada.

SELECTED PAPERS OF HAVEN EMERSON

The volume, "Selected Papers of Haven Emerson," referred to in the editorial section of the November issue, is available from the American Public Health Association, 1790 Broadway, New York 19, N.Y., at *$3.30* a copy, postpaid. The Association has generously offered to absorb the difference in exchange.

NEWS

The Sixth Prentiss Award

HARRY E. KLEINSCHMIDT, M.D., a master craftsman in the field of health education media, has been awarded the Elizabeth Severance Prentiss National Award in Health Education, given annually since 1944 by the Cleveland Health Museum. As a former staff member of the American Social Hygiene Association (1917-1923), the Toledo Public Health Association (1923-1925), former director of health education in both the Ohio Department of Health (1925-1927) and the National Tuberculosis Association (1927-1942), and more recently as medical director of the North Atlantic Area, American Red Cross (1942-1949), he has made many and varied contributions to the field of health. Among "firsts" credited to Dr. Kleinschmidt are: the first health exhibit in an army camp, first use of animated diagrams in health education, and first use of a "healthmobile".

British Columbia

DR. D. M. BLACK, a graduate of Queen's University, Belfast, Northern Ireland, has accepted the position of director of the Prince Rupert Health Unit. Dr. Black graduated in medicine from Queen's University, Belfast, and served for two years in the Royal Victoria Hospital in Belfast, prior to entering the Indian Medical Services, in which he served in India, Singapore and Malaya, during the war. Following disbandment of the Indian Medical Services, Dr. Black returned to Belfast to obtain the Diploma in Public Health at his alma mater. Following successful completion of the course, he served a year in the Belfast Public Health Department before coming to British Columbia to serve in the local health services. Since his arrival, he has spent several weeks on orientation in the various divisions of the Provincial Department of Health before taking up his new post at Prince Rupert.

DR. G. W. WATTS has come to British Columbia from Ontario to assume the position of director of the East Kootenay Health Unit with headquarters at Cranbrook. Dr. Watts obtained his preliminary schooling in Ontario prior to entering Queen's University for his medical degree. He served in the R.C.A.M.C. in various capacities until his discharge in 1946, following which he joined the Ontario Hospital Services as physician in the Orillia Hospital. In his new position Dr. Watts will supervise and direct the public health services in a wide area. He will be assisted by a staff of five public health nurses, two sanitary inspectors, and a statistical clerk.

Alberta

MR. S. JOHNSEN, C.S.I.(C.), has joined the Division of Sanitary Engineering of the Provincial Department of Public Health after serving as a sanitary inspector with the Canadian Army (Active) during World War II and since. Mr. Johnsen will be stationed at Calgary and will cover an inspectorate surrounding that city.

MR. H. DEAN, A.R.San.I., Cert. S.I.B., has commenced employment as a sanitary inspector covering the southern section of the province with headquarters in Lethbridge. Before accepting a position in Alberta, Mr. Dean was employed in the public health field in Birkenhead, England.

MISS ELEANOR JAMIESON, B.Sc.N., formerly with the Athabasca Health Unit, is taking further study at the McGill School for Graduate Nurses, Montreal. She has been replaced by Miss Lilla E. Wright, formerly with the Red Deer Health Unit.

A NEW DISTRICT Nursing Centre has been opened at Milk River, with Miss Mary K. Anderson in charge.

MISS AMY CONROY, a former member of the District Nursing staff for many years, has returned to take over the Lindale district.

MISS ESTHER DEERING, 1946 graduate of the Holy Cross Hospital, Calgary, has been appointed to Dixonville.

MISS FLORENCE KENNEDY, 1941 graduate of the Misericordia Hospital, Edmonton, has been appointed to the Nursing District of Alder Flats.

MISS MARGUERITE RIES, 1941 graduate of the Holy Cross Hospital, Calgary, has joined the Provincial staff and is stationed at Grassland.

MRS. O. H. CORISTINE, formerly Miss Jean Blackbourne, was married in November but is continuing the service at Hines Creek until the spring.

MISS ANNE NORDTROP has returned from sick leave and is stationed at Worsley.

MISS K. AMBROSE has been transferred to Fort Assiniboine, Miss Nellie Beatson to Youngstown, Mrs. K. Coutts to Lomond, Mrs. M. C. Faulkner to Whitecourt, and Mrs. Nina Renwick to Maloy.

MRS. ESTHER BAILEY has returned to the staff to give a part-time service at Hamaruka.

Manitoba

TWO NEW DOCTORS, D.M.I. Harmar and Homer Rea, have been appointed to health units in Manitoba. Dr. Harmar is a native of Birmingham, England, and graduated in 1933 from the University there. He was in private practice and later became district medical officer for the City of Birmingham. In 1943 he joined the R.A.M.C. and a year later became a surgeon in the British Merchant Navy, in which he served until 1949, with the exception of a year spent at the University of Birmingham where he obtained his qualification in public health. For six months before he came to Canada he was medical health officer for the Southern Combined Districts of Breconshire, Wales. Dr. Harmar has been posted to the Swan Valley Health Unit. Dr. Rae came to the Virden Health Unit from Burgeo, Newfoundland, where he was the only doctor in the outpost hospital. He is a native of Hilford, England, and graduated from St. Mary's Hospital, London, in 1944. He joined the R.A.M.C. and for a time was in India. After the war he went back to St. Mary's Hospital and spent some time at the Royal Northern Hospital in London before he left early in 1949 for Newfoundland.

DR. K. C. YEO, Deputy Director of Health Services in the Hong Kong Medical Department, was in Manitoba for almost two weeks late in November and the beginning of December. Dr. Yeo is on a six-month fellowship from the Canadian Council of Reconstruction, through UNESCO, to study health administration in the Dominion.

Ontario

THE 1949 ANNUAL MEETING of the Ramazzini Society was held at Muskoka Beach Inn from September 17th to 19th. The membership of this organization consists of a limited group of physicians representing those on the continent who are especially interested in the field of occupational diseases. On these occasions they meet together to honour the memory of Bernardino Ramazzini, the world-famous Italian physician and pathologist, considered to be "The Father of Occupational Medicine." Ramazzini was the first to make a thorough study of the relation between occupation and the health of the worker. His observations in this connection were recorded in the book "De Morbis Artificum", published in 1700. A feature of the program is the annual Ramazzini lecture or "oration", which is given either by a member of the Society or by some distinguished guest. The subject of the 1949 "oration" was "Occupational Medicine: its Role in the Social World". It was delivered by Dr. Rutherford T. Johnstone, Consultant in Industrial Health and Lecturer at the University of California, Los Angeles. Twenty-three members attended this annual meeting, which was the fourth since the inception of the Society and the first to be held in Canada. All arrangements were made by the Canadian members.

FEDERAL FUNDS have been earmarked to provide the salary of an additional public health nurse for the Welland and District Health Unit. This unit was recently expanded by the addition of about 13,000 people through the inclusion of Stamford Township in it. Plans call for the development of a public health program in the secondary schools and the organization of two additional child health conferences in the area.

USE OF FEDERAL HEALTH GRANTS has been authorized to add a veterinarian to the staff of the health units in Northumberland-Durham and in Huron counties. These officers will be responsible for developing improved food-control services.

IN PRINCE EDWARD COUNTY a doctor will join the health unit staff on a part-time basis to act as school medical officer and to extend existing school health services.

AN EXTRA NURSE is to be added to the Brant county health unit staff to help provide service for the four new schools in the area and to assist with the newly organized

health program in secondary schools. Salary for an additional nurse for the Dufferin county health unit has been authorized as an epidemiological survey in connection with poliomyelitis is being continued for another year in that area, and extra staff is needed to assist with this project and to maintain general public health services.

More Extensive Mental Health Services are planned for the Niagara Peninsula with the authorization of salaries from federal funds for a full-time psychologist and a full-time psychiatric social worker to assist the psychiatrist at present holding mental health clinics in the general hospitals in St. Catharines, Welland and Niagara Falls. The extra staff will permit expansion of the services offered by the clinics and an increase in their numbers to cover other urban centres and rural areas.

Four Junior Fellowships for post-graduate study in psychiatry at the University of Western Ontario, London, will be financed from the federal health grants. Funds have also been earmarked to meet the salary of a part-time clinical instructor in psychiatry and to buy an electroencephalograph for the neurosurgical unit of the Victoria Hospital.

Hospitals in St. Catharines, Southampton, Wiarton, Burke's Falls, Atikokan and Englehart have been awarded grants totalling $89,500 to help meet their building costs. The new Hôtel-Dieu Hospital, St. Catharines, is operated by the Religious Hospitallers of St. Joseph. The last four hospitals named are all Red Cross hospitals, and are being financed by local subscriptions and grants from the Canadian Red Cross Society, and the provincial and federal governments.

A Newly Formed Division of the Health League of Canada will undertake popular education in the fields of maternal and child health and welfare. Heading the new division's voluntary directing committee are Dr. Nelles Silverthorne, Toronto pediatrition and former chairman of the Health League's National Immunization Committee, and Dr. H. B. Van Wyck of the Department of Obstetrics and Gynaecology, University of Toronto. It is felt that if the Health League can turn the spotlight of public education on maternal and child health and welfare as successfully as it has in the field of diphtheria immunization, equally striking results can be anticipated. The work of the new committee, incidentally, will tie in with Health League divisions already established, particularly immunization, nutrition and pasteurization. The present immunization division will function as a section of the new division under the direction of Dr. F. O. Wishart of the School of Hygiene, University of Toronto.

New Brunswick

Miss Katherine MacLaggan, Reg. N., is filling a new position at Teachers' College, Fredericton, as full-time instructor in health. A 1945 graduate of the School of Nursing, McGill University, Miss MacLaggan served for three years on the staff of the public health nursing services, Department of Health, and is well known for her work in Westmorland County. Miss MacLaggan's program at Teachers' College will comprise a health service for the students and a teaching course. The latter is aimed at giving the student-teachers instruction in the prevention of disease, observation of children for abnormal defects or diseases, mental hygiene and school sanitation.

Nova Scotia

The Present Halifax Municipal Hospital at Cole Harbour is to be enlarged by the addition of a new building to house 210 patients. The provincial and federal governments are each contributing $300,000 toward construction costs. The hospital is operated by the County of Halifax.

Four More Hospital construction projects, which will provide an additional 265 beds for patients in Nova Scotia, have been approved recently. In New Glasgow, the present Aberdeen Hospital is to be replaced by a new 213-bed hospital on a new site. St. Martha's Hospital, Antigonish, is being expanded to hold 111 more beds and a children's section. To provide facilities for minor surgery, medical and obstetrical cases in the Musquodoboit Valley, a large residence at Middle Musquodoboit has been converted into a 10-bed hospital. The Eastern Memorial Hospital, Canso, will have 10 beds and similar facilities. The latter two hospitals are operated by the Nova Scotia division of the Canadian Red Cross Society.